THE RUBBER AGE

ESTABLISHED 1917

COVERS ALL PHASES OF THE PRODUCTION AND MARKETING OF CRUDE RUBBER AND THE MANUFACTURE AND DISTRIBUTION OF RUBBER GOODS

Vol. 40 DECEMBER, 1936 No. 3

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No. 52

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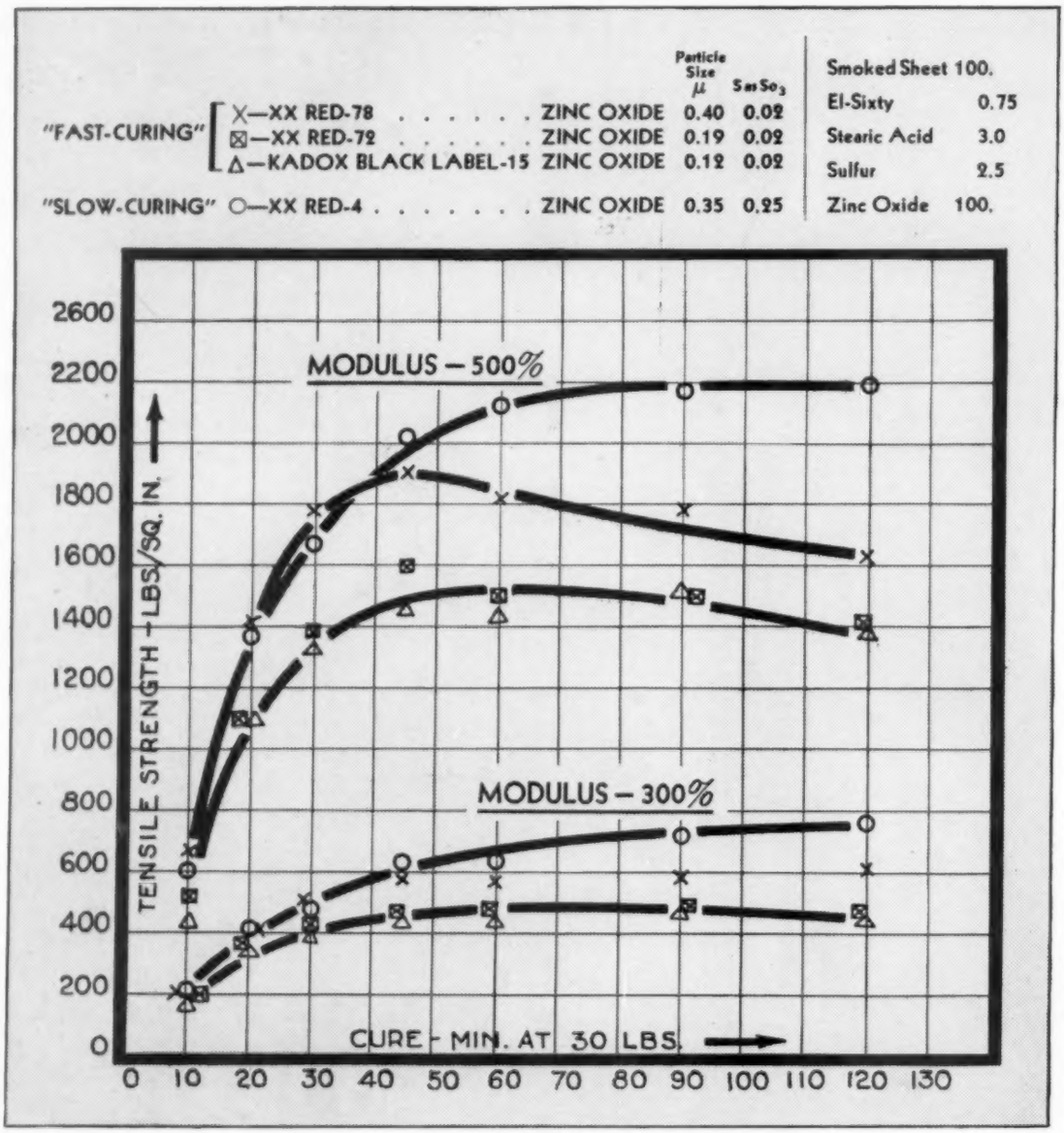
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0 10 20 30 40 50 60 70 80 90 100 110 120 130

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UNIFORM QUALITY ZINC OXIDES

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The Rubber Age

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Vol. 40 DECEMBER, 1936 No. 3

Recent Advances in Latex Technology

By Royce J. Noble, Ph.D.

THE activity in development work on direct applications of latex has been fully as great in the past year and a half as in any period of its history. The volume of latex imports has shown a sharp increase since 1932, and although latex is certainly past the initial stages of its development, at least in certain fields, the publication of literature and patents pertaining to its many uses continues unabated. From time to time progress in latex technology has been reviewed, the latest of such publications covering the developments up to the latter part of 1935. The purpose of the present review, therefore, is to report progress since that time of these recent developments, and only such as appear to be of greatest actual or potential significance are discussed.

The advantages of latex have often been cited in the literature and need not be further discussed at this time. One disadvantage in the use of latex in recent years has been a price differential of 2 to 3 cents per pound solids over sheets. With the low price of rubber this difficulty has been a serious handicap at least in some applications. As the price of rubber continues to advance this differential becomes an increasingly smaller factor.

The first requisite for establishing a firm basis for latex development generally, is a uniformity of raw material. This matter has been the subject of a great deal of investigation in the Far East, particularly as to the elimination of discoloration of latex, either due to methods of handling on the plantation or as a result of contamination by the shipping container. It has been definitely shown that much of the so-called natural discoloration of latex in the past has been due to the formation of iron sulfide and steps have already been taken to eliminate this both by exclusion of iron-bearing materials on the plantation and by the use of a protective coating on the latex container.

There has also been much interest in eliminating the use of brass sieves for straining latex on the plantation, a practice of which most American consumers appear to be unaware. A third improvement in plantation practice is the development of larger bulking facilities. This is perhaps the most important single factor contributing to uniformity of latex. In the past it has been the practice to ship latex bulked only in quantities of 400-500 gallons. The present day tendency is toward bulking capacities in the order of 15,000 gallons. All these improvements are of the utmost importance to the latex industry, since it is only by standardizing the raw product that any permanent advance in its application can be made.

Of equal importance to the manufacturer of latex goods is the development of suitable control methods.

This paper is based upon a talk given before the Rhode Island Rubber Club on December 11, 1936.

Evidence of interest along these lines is shown by the appearance in the literature within the last few months of a number of methods particularly adapted to control work for latex specifications. The Crude Rubber Committee of the Rubber Division of the American Chemical Society is also concerned with the establishment of a complete set of standard methods for the examination of latex.

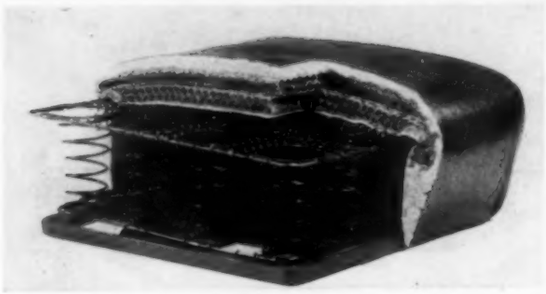
In the concentration of latex, creaming methods appear to be of greatest general interest at the present time. Centrifuged latex, however, has firmly established itself and is being made in considerable quantities both in this country and in the Far East. Of the imported concentrates, however, creamed latex is probably in excess of all others.

Because of the general use of compounding agents in some form with latex there is a wide-spread interest in suitable stabilizing materials, both natural and synthetic, and numerous publications have been made concerning the relative efficiency of such protective agents. Incidental to this work valuable information has been gained as to the destabilizing effects of certain compounding agents such as zinc oxide and carbon black.

Progress in Textile Finishes

One of the widest fields of application of latex is in textile finishes either by impregnation or coating. It has been definitely established that latex does not penetrate the fibers themselves but many pass between and surround individual fibers of a thread provided proper conditions are observed. Open fabrics made up of lightly twisted yarns are of course easily saturated but the more difficult task of impregnating such materials as ropes, belting and the like has been successful also. For difficult conditions of this type the impregnation is effected either by pressure or vacuum or alternating applications of these conditions, depending upon the material involved.

As a special application of impregnation attention may be called to the production of crease-resisting fabrics. The earliest attempts in this direction were by the use of urea formaldehyde resins, but recently latex has been successfully used particularly with certain types of fabrics. Other specialized applications of this kind are in the treatment of fabrics to prevent fraying of cut edges and for delustering artificial silks and the like.



Nukraft, latex-impregnated hair in the shape of figure 8's, is one of the latest latex developments.

Advance in spreading operations has not been as rapid as in some of the other applications. This is due in part at least to the difficulty in obtaining surface characteristics as desirable as those obtained with rubber in solvent. One characteristic that appears to be generally objectionable is the damp or slightly tacky condition usually observed on latex-spread surfaces. This is generally believed to be due to the non-rubber constituents of the latex; it may be overcome in several ways, the most common procedure being to chlorinate or brominate the surface.

There has been some interest in the development of spreading equipment particularly adapted to latex. Improvements of this nature comprise an arrangement of nozzles for applying latex to the coated surface mounted either in a special relation to the spreading knife or in such a manner as to execute a reciprocating movement over the surface of the fabric.

Of all the direct applications of latex, that of dipping is most active, and in the manufacture of certain articles has almost entirely replaced the old method of gum dipping. It is not to be presumed, however, that the latex method of dipping is entirely free from difficulties. It is most important for success in this type of manufacture that proper equipment be chosen and that certain details of procedure be carefully observed. It is important that latex compounds be kept free of all foreign material, that forms particularly adapted for each type of manufacture be used, and that suitable conditions of temperature and humid-

At the left is a group of rubber products molded direct from latex by the Kaysam process, the essential features of which comprise the use of a heat sensitive latex, pouring the compound into an aluminum mold, and jelling either at room temperature or by application of heat.

ity be maintained. Although it is possible to make thin dipped articles by simple immersion of the former in the latex compound, it is becoming more generally the practice to use either a porous form which will retain a heavy latex deposit on its surface or to use dehydrants or coagulants on the form before dipping. Alternatively, heat sensitive latices may be used in conjunction with heated forms.

By taking advantage of these improvements in the art, heavy-walled rubber articles such as hand grips for sporting goods, heavy electricians' gloves, footwear and the like may be made. Attention should also be directed to the general adoption of automatic machinery in the manufacture of thin-walled dipped articles.

Direct Molding of Latex Products

Within the last year or two direct molding of rubber goods from latex has undergone considerable advance. Molding operations are now used not only in the production of rubber articles, but in certain specialized applications such as molded anatomical and art objects. Among the methods being most actively developed at the moment is the Kaysam process, the essential features of which comprise the use of a heat sensitive latex, pouring the compound into an aluminum mold, and jelling either at room temperature or by application of heat. Hollow molded articles such as balls, may be made in a hollow mold which is rotated about two axes while the compound is subjected to jelling temperatures.

Possibly the field of application showing the greatest present activity is that of the treatment of paper with latex. All types of paper, particularly those which are highly absorbent, are either saturated or coated (or both) to produce a leather substitute specially adapted for use in the manufacture of shoe parts such as insoles, upper material for the cheaper grade of shoes, and a great number of special products.

Advance in the manufacture of rubber thread in recent years has been very rapid. This may be attributed to the fact that extremely fine counts in long lengths, and as a very uniform product, may be readily produced. Whereas the first types of latex threads were made by extrusion, a number of alternate methods have been developed. Of these probably the most important competitor of the extrusion process is that of depositing latex on a grooved surface, preferably heated, and subsequently removing the deposit which may be further stretched, twisted and subjected to other treatment prior to vulcanization. Variations in this procedure comprise the use of a core of fibrous or other material or the incorporation of a fibrous material in the latex compound employed.

Latex in Adhesive Compositions

Although the use of latex in adhesive compositions constitutes a rather large industry in itself, very little real advance has been made. Some work has been done, however, toward increasing the adhesive properties by special treatment of the latex. If it is subjected to the action of hydrogen peroxide over a period of several hours a product of improved characteristics is obtained.

An interesting special application of latex which is daily increasing in volume is that of cable insulation. It has been found that if rubber is so treated as to remove a large part of its content of protein and mineral salts, its value for insulation is greatly enhanced. Removal of this material is best practised on the natural latex rather than on sheet rubber and at least two large companies in this country are actively engaged in the manufacture of latex purified and deproteinized by repeated creaming or centrifuging.

Protex, a latex covering material developed by American Anode, Inc., represents another specialized application of latex.

A large number of specialized applications of latex which have been recently developed are of interest as showing its general adaptability for service under a wide variety of conditions. One specialized application that is spreading into a number of industries is the use of latex as a protective coating. Recent tests show that it is well adapted to the coating of automotive metal parts and even of the entire automobile. Coatings of this kind serve to protect the finish until delivery.

Other Specialized Applications

Latex has also been used as a covering for machinery and tools to prevent rust during storage and transit, and as a coating for spray booths or other surfaces which must be cleaned periodically. The latex is rapidly applied and the rubber layer may easily be removed when desired.

The use of latex sponge rubber for upholstery is already well known. Another use of latex for upholstery material is that of bonding curled hair to form shaped upholstery parts.

There are a large number of very specialized uses of latex which have not yet grown to the point of consuming any large volume of latex but which are, nevertheless, of interest. Among these may be mentioned its use in self-sealing envelopes, as a lining for fiber shipping containers, as a thickener for lubricating oils, etc.

Finally, mention should also be made of processes whereby rubber in powdered form is produced from latex. Three standard methods in the manufacture of this product have already been developed, and although it has not yet assumed any commercial importance it has aroused no little interest both on the part of the conventional rubber manufacturers and in the development of new applications where neither crude rubber as such nor latex are suitable.

Buried Telephone Wire

THE cost of underground cable in conduits and of buried cables essentially limits their use to those cases where appearance is really important or where a number of circuits can be grouped under the same sheath. The urge to put telephone lines underground, however, is almost as old as the industry itself. In the interest of providing a lower cost type of plant and thereby making possible a more extensive service in

Fig. 1—Method of Splicing

certain communities, particularly rural centers, the development of an inexpensive form of buried circuit was recently undertaken by engineers of the Bell Telephone Laboratories, Inc. The resulting wire is described in the November, 1936, issue of the *Bell Laboratories Record*, by D. A. Quarles.

One of the most important features that must be included in buried telephone wire is serviceability. On this point it remained for the Bell research chemists to develop a special rubber compound that could be used to insulate a pair of wires and could be relied upon to maintain suitable insulating properties over a period of years under the severe moisture conditions encountered underground. Development engineers designed a wire with appropriate transmission and handling characteristics, and in addition had to devise a special method of splicing the wire.

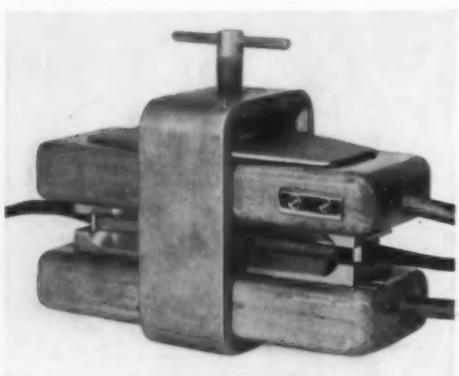


Fig. 2—Electrically-heated Mold

As actually made, the new wire employs annealed copper conductors, insulated in parallel twin construction with the special rubber compound. It is adapted to a continuous process of extrusion and vulcanization by the Western Electric method. The insulation is sensitive to sunlight and must be carefully guarded from any unnecessary exposure to direct rays of the sun prior to installation.

Another problem was encountered in splicing, since the splice must be as resistant to water absorption as the wire itself. In the splice, as actually developed, the conductor joint is made by pressing a cylindrical sleeve on the abutted ends of the wires to be joined, producing a tight joint of high electrical efficiency which is relatively immune to corrosion. The joints in the two wires are staggered and the whole is encased in a pad of unvulcanized rubber which is pressed in place and vulcanized in an electrically-heated mold. The method of splicing is shown in Figure 1, while the electrically-heated mold is seen in Figure 2. To insure proper control of the temperature, the vulcanizer is equipped with a thermostatic device. Tests indicate that the splice is the equivalent of the unspliced wire.

Successful application of buried telephone wire led to several other problems, including loading and, more particularly, installation. In the latter case a special cable-laying plow was developed, the wire passing through the plowshare at a specific depth. The new wire is still in the experimental stage, only a few hundred miles having been laid, and while new problems are expected to crop up, such as soil erosion and difficulties caused by burrowing rodents, such as gophers, the wire has distinct advantages over exposed circuits. Present indications, according to Mr. Quarles, are that many locations will be found where the new buried telephone wire will prove economical.

F-77—A New Glossy Finish

DESCRIBED as a fine-particle wax emulsion, a new glossy finishing material has been introduced by the Franklin Research Company, Philadelphia, Pennsylvania. Sold under the name of Formula F-77, this new finishing material is said to leave a thin, lustrous film that overcomes tackiness, prevents oxidation and resists dirt, dust and water. It is easy to apply, dries quickly and is economical to use, according to Franklin Research. In application, Formula F-77 is said to become a part of any rubber surface while preventing unsightly bloom and preserving the appearance of newness. It may be applied with a rag, sponge or spray gun.

The new material is applicable to such rubber products as tires, running boards, matting, stair treads and miscellaneous mechanical goods, as well as a wide variety of molded products, imitation leather, etc. It is available in two forms, i. e., clear, which emphasizes and brightens colors; and a rich black, which covers blemishes.

Every Rubber Technologist Should Have
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Cabot's New Laboratory

Recently Completed, It Contains Special Apparatus for Research on and Technical Control of Carbon Blacks

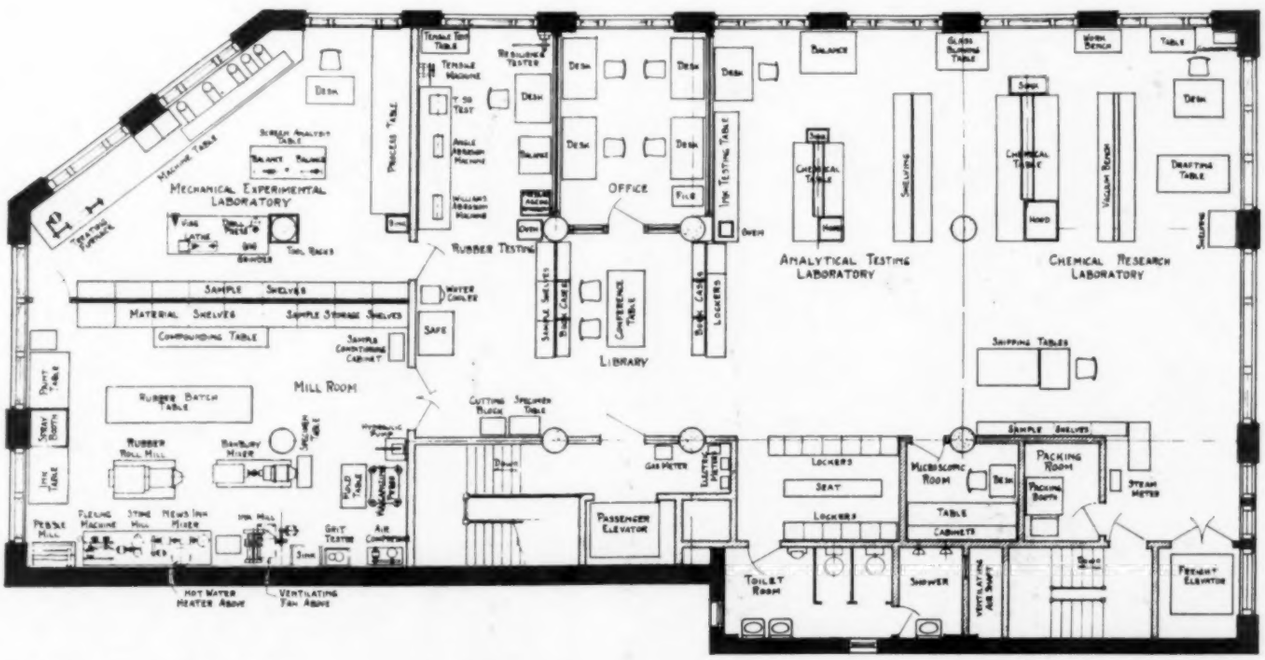
ANOTHER milestone in the progress of carbon black—the world's outstanding black reinforcing pigment for rubber—is seen in the recent completion of a new testing and research laboratory by Godfrey L. Cabot, Inc., of Boston. The price of progress is continuous research and the Cabot company, long pioneers in the scientific development of carbon blacks, upholds the ideals of its founder by making possible further research and technical control of carbon black by means of new and enlarged laboratory facilities.

Carbon black has come a long way since the day over 70 years ago when it was developed to replace lamp black in the manufacture of ink. That single use of this pigment has expanded tremendously until today its unique properties find application in many fields other than ink—it is now used in paints, varnishes, lacquers, paper, crayons, carbon paper, linoleum, shoe and stove polishes, and in numerous other products including rubber where about 85% of the total production is concentrated today.

The increase in production from about 1,000,000 pounds in 1882 to over a third of a billion pounds last year was not due entirely to a natural growth—it was made possible largely by the extensive research activities of carbon black producers, who have always been seeking means of improving the quality of the product, decreasing its manufacturing cost and increasing its use in widely diversified industries.

Provision for all sorts of tests is made in the Rubber Laboratory

Modern conditions necessitate entirely different laboratory equipment from the simple apparatus used in the early days of carbon black development. Tests today not only cover color, tinting strength, covering



The logical arrangement of the respective sections and their equipment is seen in this floor plan of the new Cabot laboratory at Boston.

Microscopic Laboratory

View of Analytical and Research Divisions

power, abrasion resistance, rate of cures, reinforcement properties, etc., of the product itself but they also go further afield by contributing to the determination of all of the minute details of gas black manufacture, such as size of flame, design of orifice, spacing of tips, gas pressure, drafts, etc., to insure economy of operation and maintenance of quality. To this must be added the continual necessity of meeting consumer demands for carbon blacks to meet the requirements of new processes or new products, or both.

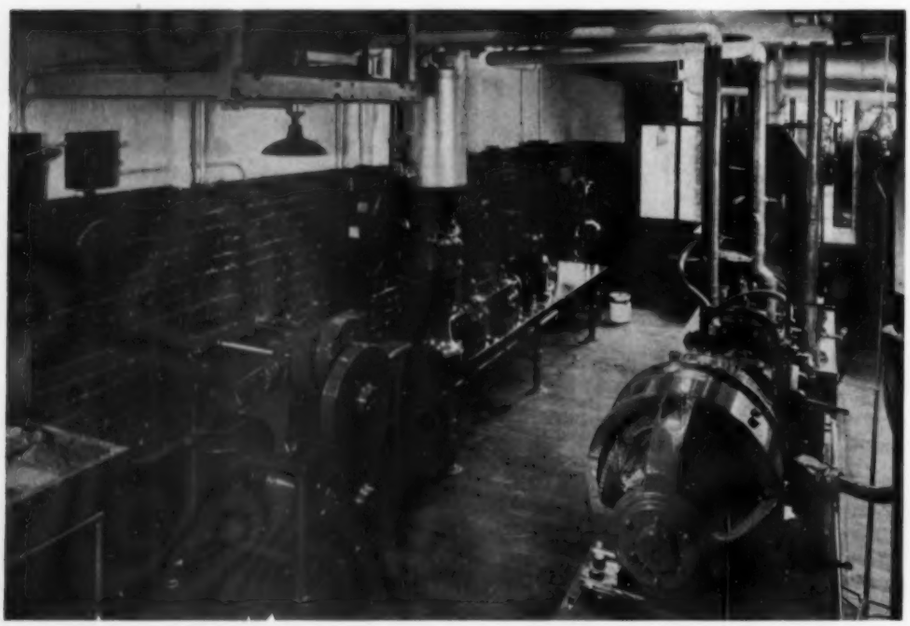
The new Cabot laboratories have been designed to meet all these conditions. Not only do they contain all of the usual standard testing equipment found in similar laboratories, but they contain in addition much apparatus especially designed by Cabot engineers and chemists. The laboratories are housed at 49 Beach Street, Boston, on the top floor of a modern fireproof building, located within a few minutes' walk of the company's executive offices. The space occupied is in excess of 4,000 square feet, exclusive of that used for storage in the basement.

Being located on the top floor, the laboratories have adequate natural light and ventilation. The lighting system was specially designed to throw a minimum of shadows. The floor is wood over concrete and the walls are painted in cabinet green for the lower half and white for the upper half and ceilings. All the work benches are mounted on piping for rigidity and also so that the floors may be more easily cleaned.

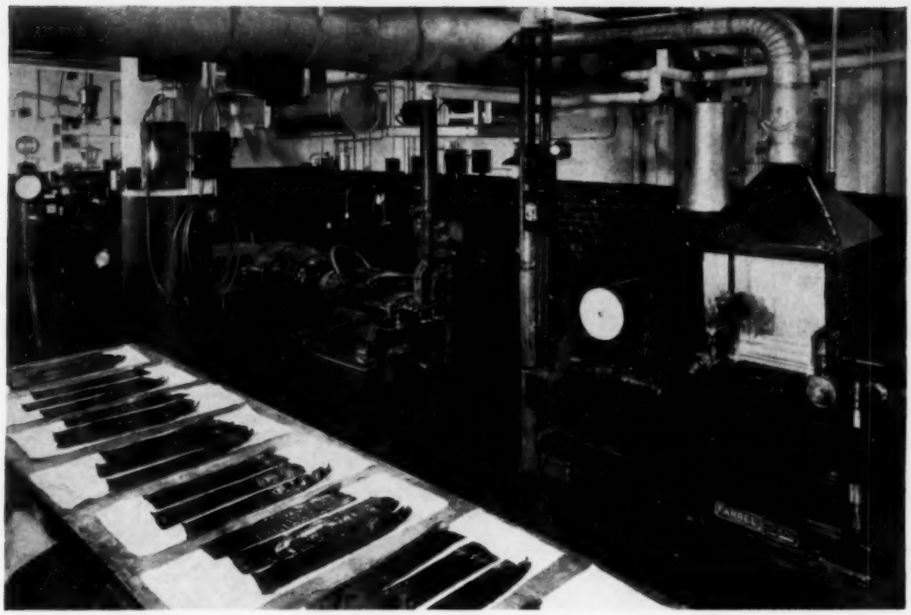
The complete laboratory is divided into the following sections: Research, Analytical Department, Microscopic Test Room, Mill Room, Testing Laboratory, Mechanical Development Room and the Office and Library. Facilities are provided for handling carbon black in a special room, while ample lockers, wash rooms and showers are available.

The Research Room contains in addition to desks, drafting table and storage shelves, a vacuum bench especially designed for studying the decomposition of gases. This is one of the few layouts of this nature available in this country. It was designed by Dr. W. R. Smith, in charge of research.

The Analytical Department contains full equipment and supplies for testing and examining inks, paints, lacquers, etc., and for making chemical analyses of any materials or compounding ingredients used in the rubber, paint or ink fields. Adjacent to this department is the office and library where all records are kept and books and technical journals are filed.



Interior view of the Mill Room which is separated from the other departments by a solid wall to prevent dust and noise from interfering with operations.



Another view of the Mill Room showing the Farrel roll mixer, latest type laboratory Banbury, platen vulcanizer and a work table in the foreground.

The Microscopic Test Room contains apparatus for color measurements, microscopic tests, etc., consisting of a microscope, an ultra microscope, daylight illuminator and a specially designed piece of apparatus called the Nigrometer used for measuring differences of blackness in samples of carbon blacks. This instrument was designed by Cabot engineers in collaboration with the Massachusetts Institute of Technology. It is an adaptation of the Intensometer used in the optical field. It measures comparatively the amount of light reflected from a black surface. The surface of the sample is illuminated brilliantly and by means of a movable standard light source to which a scale is attached, the amount of reflected light from the sample can be balanced, and a numerical value given to the black being tested.

This apparatus makes it possible to establish a scale of black standards which are identical and uniform at the Cabot plants and laboratories and at the laboratories of customers who desire blacks of certain color intensities.

The Rubber Testing Laboratory provides facilities for making abrasion, tensile, aging, rate of cure, grit, resilence, tear, flex and similar tests. It contains a duPont-Williams abrasion tester, a redesigned Akron Standard Mold Company angle abrasion machine, Scott tensile tester, a special pendulum impact resilience tester built by Scott, aging oven, an Emerson combination oxygen and air bomb tester, a T-50 tester for state of cure, in addition to dies, scales, etc. The Cabot grit tester and the duPont flex-cracking machine are located in the Mill Room for convenience.

The Mill Room is separated from the other departments by a solid wall to prevent dust and noise from interfering with other operations. This room is equipped with a suction system connected to the open mill, Banbury and the platen vulcanizer and with a unit heater close to the ceiling to provide heat when necessary. The equipment includes a new Farrel roll mixer, latest type laboratory Banbury, platen vulcanizer, 3 roll ink mill, high speed mixer for news ink, stone mill for grinding paints, lacquers, etc., pebble mill, spray booth, air compressors. Circulating hot water is supplied to both the mill and the Banbury at any desired temperature.

A feature of the Banbury installation is the 10 h.p. oversize motor which gives a speed range of 40 to 160 r.p.m. on the rotor of the mixer and the use of a specially designed air pressure system for operating the ram and controlling the pressure on the charge

Mechanical Development Department

Research and Analytical Departments

in the mixer. This system was designed to replace the standard leverage method operated by hand so as to insure constant and even pressure on the charge. For hot breakdown purposes the Banbury is heated with either high pressure steam or water at any desired temperature.

Office and Library

The Mechanical Development Room contains various types of mechanical equipment used for developing new products, improving methods of pelleting pigments and other new work of similar nature.

In addition to the main laboratory in Boston, the Cabot company maintains testing and control laboratories at each of its various plants to insure uniformity in quality and adherence to customer's specifications. All laboratories and staffs are under the direction of F. H. Amon, Chief Chemist.

Enzymes as Vulcanizing Accelerators

ON TRYING to synthesize certain enzymes German chemists found that organic compounds of relatively simple chemical composition possess catalytic properties. For example, isatin is a typical dehydration catalyst. It absorbs hydrogen from amino-acids and gives it off to the air producing water. Similar action is exercised by lactoflavin but only in the presence of colloidal carriers. Other reactions which are carried out with the aid of simple organic catalysts are the decomposition of pyroracemic acid into aldehyde and carbon dioxide which is a side-reaction in the alcoholic fermentation, and the catalytic saponification of organic esters to acid and alcohol. From such simple organic catalyts highly active compounds may be developed which resemble enzymes in many respects. The method of activating them consists in introducing certain atom groups in the molecule of the catalyst. In doing this, a number of substances are produced differing by the position of the activating group of atoms in the molecule. When all the isomera possible are obtained it is easy to determine which possesses the strongest catalytic action.

By these methods a number of compounds have been developed which bear a similar relation to natural enzymes as the coal tar dyes bear to natural coloring matter of plants: they are chemically different but produce the same effects.

Synthetic enzymes are not only equal to natural but are more stable. The principal application of these artificial compounds is in vulcanization of rubber where they represent an important group of accelerators. Most of them exert their action by entering with sulfur into chemical compounds which are more reactive than sulfur alone. Whereas in the earlier period of vulcanization of rubber higher temperatures and longer treatment were necessary because of the relative chemical inertness of sulfur, the use of the new accelerators saves time and fuel and incidentally preserves the susceptible molecular texture of rubber.

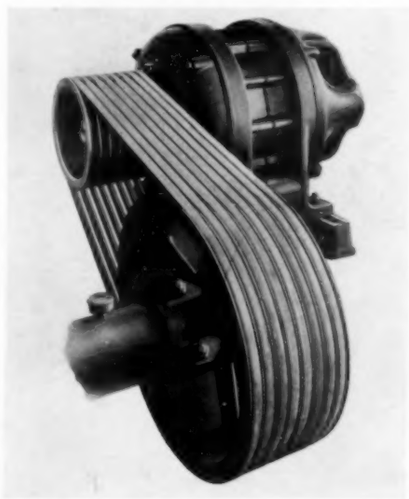
(EDITOR'S NOTE: The above information is excerpted from "German Chemical Notes" of October 3, 1936, submitted to the Leather and Rubber Division of the Bureau of Foreign and Domestic Commerce, Washington, by Consular Clark W. S. Jesien, stationed at Frankfort-on-Main, Germany).

Texrope Drive Belts

WIDTH and thickness in a rubber drive belt must be in a definite proportion to the width. If a belt is too thick distortion in bending takes place, while if too thin, the belt lacks lateral rigidity as well as sufficient driving surface. These fundamentals were taken into consideration in the development of the Texrope drives made by the B. F. Goodrich Company for the Allis-Chalmers Manufacturing Company, Milwaukee, Wisconsin.

Texrope belts are manufactured to produce definite widths as well as exact angularities. The grooves in the sheaves are also machined to exact angles to permit the belts to enter and seat perfectly. When the belts bend over the sheaves there is a natural tendency to expand or bulge, action of this kind exerting a pressure between the belt and the groove and resulting in a high coefficient of friction.

Originally, Texrope belts were of a laminated construction with the driving sides open or exposed. This construction permitted air, moisture and dirt to work into the cord or pulling section, and made no provision for a wrapping or outer cover to resist ply separation.



An outer wrapper was later developed to prevent foreign matter from settling in the cord section.

The latest development in Texrope drives is the provision of a lateral fabric section near the top of the belt to resist buckling or U-shaping which prevents the belt from working its way too deeply into the grooves. According to Allis-Chalmers, the new belts are exceptionally flexible longitudinally, while the lower or compression members freely permit bending without excessive internal friction.

Safe Use of Solvents

Methods of Handling Benzol, Gasoline, Carbon Tetrachloride and Carbon Bisulphide—All Used in the Rubber Industry

By R. S. Farnum

Safety Supervisor, U. S. Rubber Products, Inc., Detroit

AMONG the solvents used in the rubber industry are benzol, gasoline, carbon tetrachloride and carbon bisulphide. In another class for which there is a slightly different use are turpentine and sunoco spirits or kerosene. These latter two, used especially for cleaning purposes, have hazards of fire and explosion and not so much danger from toxicity.

The safe limit for vapor concentration of benzol in the air is 100 parts per million, which shows that the use of this solvent is dangerous without proper protection. Benzol poisoning from inhalation of the vapors produces anaemia, and changes the number and types of white blood cells, causes hemorrhages of mucous membranes. If the poisoning is continued, it produces liver degeneration and nervous symptoms.

Chronic benzol poisoning develops headache, dizziness, weakness, loss of appetite, pallor and shortness of breath. This poisoning is progressive, and if in an advanced stage recovery is slow. Even death may occur a year or two following exposure.

Xylol Safer To Use

Xylol which is a derivative of benzol and which is being used considerably as a substitute for the more dangerous benzol has some of the same properties. It is much safer to use, however, because it is less toxic, has a higher boiling point and is less volatile, consequently less concentration of vapors in the air. To be sure xylol usually has enough of the lower boiling point benzol to produce benzol poisoning if handled without the proper safeguards. Further it does not produce the same blood picture as much, as it warns the worker what can occur.

Benzol in contact with the skin is irritating and dries the skin by removing the natural oil secretions. When used as a solvent in making rubber cements, as in churn rooms, it should be piped direct to the churn, so that no handling in cans in the open is necessary. Then it will not have much chance to evaporate nor come in contact with the body.

Old methods called for drawing it into a can and pouring it into a churn. A safe method is to run the solvent into the churn and at the same time release into the churn carbon dioxide gas under pressure to form an inert atmosphere within the churn, thus eliminating the possibility of an explosive mixture of gas.

All churns, hangers, pulleys and belts and shafting in a room where this type of mixture is being made should be adequately grounded, and these grounds tested at least once per month. Only properly installed vapor proof lights and vapor proof switches should be used in a churn room, and it is preferable that the switches be located outside of the churn area. This churn room should be provided with positive fresh air supply and positive exhaust, preferably in opposite corners of the room. Exhaust ducts should be positively tight and take the air from a point near the floor. The exhaust lines should be equipped with a vane indicator or alarm which, should the exhaust fan stop, would cause a bell to ring and notify those in attendance.

Another very important point is the method of emptying the churn when the batch has been mixed. Better than air pressure, which is a common means of expelling the cement, is carbon dioxide gas under pressure. This again obviates the possibility of a fire or explosion. Air pressure from the plant air supply will get the cement out, but there is always that possibility of a static spark. Even if the air lines are equipped with check valves, there is still that remote possibility of an explosion.

When drawing off cement only properly equipped safety cans should be used. If the spring cover type is used, there must be assurance that the gasket in the cover is in place so that the cover will not strike the can and also that the cement will not spill while the can is being handled or is in transit to a remote part of the plant.

Gasoline is a common solvent used in mixing paints and cements and, like benzol, should be handled carefully. The degree of toxicity is not as great as that of benzol, but continued exposures to high concentrations will produce slow developing nervous conditions, vomiting, nausea, ear and eye symptoms, weakness, tremors and a slow kidney degeneration. Short periods in gasoline or naphtha vapors are liable to produce acute delirium and unconsciousness. Chronic poisoning from these fumes, unlike benzol poisoning, develops no specific warning signs but creeps up on the victim.

Safety in Pumping Gasoline

When gasoline is pumped into a safety can, the can should be grounded to the pump prior to filling. By hanging a chain from the pump to the can this grounding can be accomplished. The hose nozzle should be non-ferrous metal to avoid any sparking should the nozzle strike the can. Again the proper type of safety can must be used in transporting this solvent. It is extremely dangerous to use the old style milk can with the wide cover. Plants still have them around, and the best thing to do is to move them out of the area where in a hurry some careless or thoughtless worker might grab one and fill it up, figuring that just one wouldn't do any harm.

If a portable tank is used, it should be one approved by the underwriters for gasoline and not for oil. The

This paper was presented at the 25th National Safety Congress, held in Atlantic City, N. J., October 5-9, 1936.

requirements of the two differ widely, although both will hold a liquid. In our plant, 50 gallon portable tanks equipped with rubber tire wheels, drag chains and flash back screens in the filler opening are used. This solvent should be applied with a swab on a wooden handle, and the gasoline should be kept in a safety can equipped with a special plunger, basin and screen to accommodate the swab. The screen should always be in place. Should the screen interfere with the work, a cover should be provided, equipped with fusible links.

Safety cans unless carefully used are likely to be knocked off the bench or building machine. Gasoline, if dropped on a floor switch, will collect under the switch cover in the form of vapors. The first contact will ignite the vapor, and the result is a fire. Theoretically the remedy for this hazard is to provide vapor proof switches.

The machine for cementing treads passes the tread between rollers soaked in cement or under a brush upon which cement is constantly dripping. Usually a small circulating pump keeps the cement flowing on the applicator or whatever the contact with the tread may be, resulting in considerable evaporation.

It is safe practice to equip this type of operation with automatic foam dip extinguishers piped over the tank and extended through pipes reaching a few feet beyond the tank over the tread. The action of these extinguishers should be controlled by a "rate of rise" indicator or some similar temperature device which could electrically operate the extinguishers and at the same time stop the conveyor belts, ventilation motors and circulating pump, all having been previously interlocked. Any fire will be kept within a small area.

Positive ventilation systems should be installed to take the vapors from a point below as well as above the tank. It is also good practice to locate sprinklers in the exhaust ducts to overcome any fire which might creep up into them. Vapor proof motors only should be used in this sort of ventilation. When these vapors are exhausted, the discharge end should be located in a stack well out of the way of windows through which this gas might reenter, or away from any other area where gas vapors would do harm.

Here again, some sort of a vane alarm should be installed to make certain that in case the ventilation motor stops a light would come on near the operator's station or a bell or alarm would ring. For further protection all conveyor pulleys should be grounded with brushes, and drag chains be installed on the conveyor to lead off any static which might be generated.

Benzol or Gasoline As a Solvent

Hand brush applications of cement using benzol or gasoline as a solvent should be also safeguarded. Usually these operations are done on metal top tables, which should be adequately grounded to a water pipe. Fires have started when an ungrounded table was used in this type of job and a spark has jumped several inches from the end of the hand brush into a cement can. Atmospheric condition and humidity have much to do with the presence of static.

Whenever gasoline is used around switches, such as those on a portable, flexible, shaft buffer for white side wall tires, using gasoline as the swabbing agent, it is best to locate these switches a remote distance from the job. Vapor proof switches are to be preferred in any event.

Carbon tetrachloride is commonly used as a solvent for cements and also for cleaning purposes. It is dangerously toxic if vapors are highly concentrated, or if exposure is over a long period. It evaporates rapidly and has an odor not unlike chloroform. It has a drying effect on the hands after continuous contact due to the affinity for the oil in the skin. This solvent, while toxic, is less so than benzol or gasoline. Coughing and drowsiness do not occur as rapidly, although without proper ventilation serious results might arise.

Carbon tetrachloride is non-inflammable and does not support combustion. When gasoline is used as a cleaning agent, carbon tetrachloride is added in proportions of 2/3 carbon tetrachloride and 1/3 gasoline. This is done to reduce the fire hazard and to render cleaning action more effective. If in the use of carbon tetrachloride it is impossible to keep the hands out of the liquid, it is advisable to rub the hands with a little glycerine or a mixture of glycerine water and gelatine. The glycerine repels the carbon tetrachloride and prevents the removal of fats and oils from the skin.

Poisoning by Carbon Bisulphide

Carbon bisulphide is one of the most toxic of the solvents, one part per million producing mild symptoms and one and one-half parts per million producing severe symptoms. Poisoning by carbon bisulphide is slow and manifests itself with a gradual development of mental symptoms leading to serious consequences. The principal hazards are explosion, fire, poisoning by contact with the liquid and inhalation of the vapor.

Carbon bisulphide is a clear colorless liquid, highly volatile and very flammable. Its vapors are 2½ times as heavy as air and tend to settle in low areas. The ignition point of the vapors ranges from 212° to 338° F. Mixtures of air and carbon bisulphide vapors containing from 1 to 50 per cent of the vapor are explosive. The vapor burns with a blue flame and forms sulphur dioxide which is toxic to both plant and animal life.

The handling of carbon bisulphide liquid as purchased for tank lining activation is a serious problem. Drums of this liquid must be stored out of the way in a cool place and far from any possible source of heat. It should be locked in a metal cabinet conspicuously painted, preferably red, and labeled "Carbon Bisulphide"—Dangerous Explosive.

The area where activation is to take place should preferably be in a building by itself, one that has high ceilings and also one into which any large tank can be run on a flat car. All switches should be of the vapor proof type and all lights should be equipped with vapor proof globes. In the event that such a building is not possible, precautions must be taken to prevent escape of the vapors. All holes in the floor and ceiling should be filled with cement, all heating apparatus turned off, elevators must not operate, electric trucks kept out, watchmen stationed at exits to prevent those who have no business from entering.

Employees should wear protective clothing, carry no matches, wear shoes with pegs or non-ferrous nails and also be provided with splash proof goggles. If the men are to work in this gas with high concentrations they should be equipped with helmets having fresh air supply. In the case of large closed tanks with some smaller openings, the rubber on the flanges is activated by using carbon bisulphide in small quantities brushed on with a hand brush. It is a good plan

(Continued on page 162)

Electric Control for Rubber Mills

By C. W. Drake

Industrial Division, Westinghouse Electric & Manufacturing Co.

ALTHOUGH there is a national code for rubber mills and calenders, and some states have their own codes more or less following the national code, the great majority of states pay little attention to the safety features of equipment installed. A rubber code, like most laws, is unnecessary for the company or individual who appreciates the operating conditions and has the proper regard for "the other fellow." It is gratifying to see how many companies, large and small, are working for maximum safety regardless of whether the codes are enforced or not.

From inquiries and orders received by our company for motors and control equipment the knowledge or attitude of the various companies towards safety stopping is readily evident. For instance, numerous cases come to our attention of inquiries for induction motors and synchronous motors for mill line drives specifying standard control equipment with no provision for safety stopping. A few inquiries have also been received for induction motors to drive calenders where a constant speed or small speed variation was satisfactory but with no provision for braking.

In all such cases we take the opportunity of explaining to the purchaser the fact that the equipment specified includes no safety features and even if the state in which he resides does not insist on them, we strongly recommend that any equipment purchased meet the Safety Code provisions. From the humanitarian standpoint alone we feel that such action is justifiable but it is also poor economy at this date to install equipment which will not meet code requirements, since to change it over later may cost many times as much as it would when initially installed.

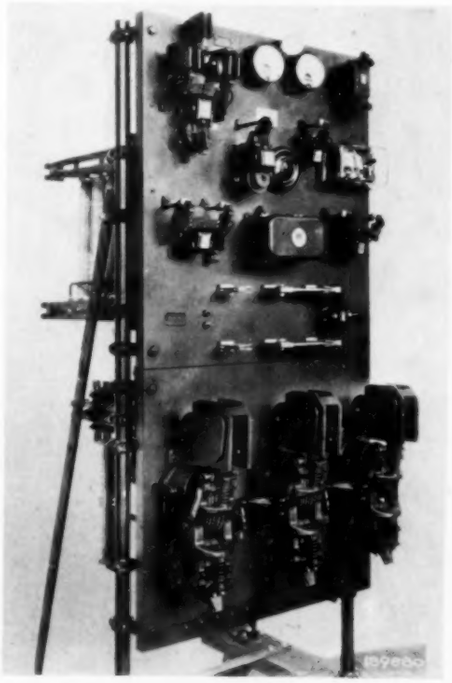


Fig. 1.

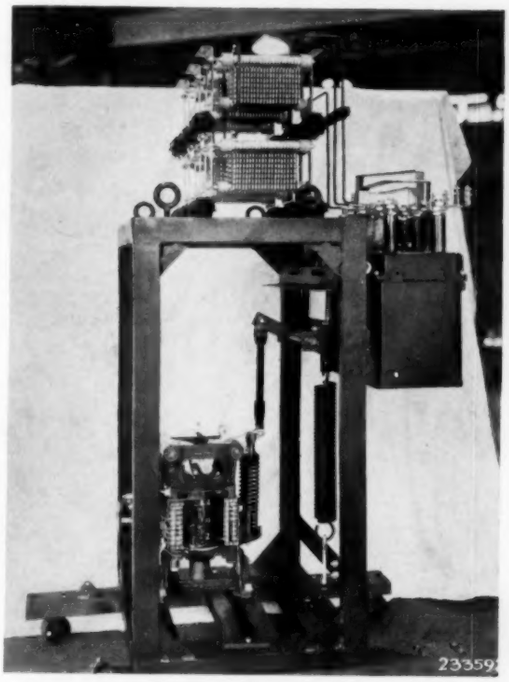


Fig. 2.

Along opposite lines we find that regardless of where installed the major rubber companies specify all equipment to meet code requirements or better. Besides this during the last few years we have noticed considerable activity towards modernization of old drives to improve stopping conditions and in some cases the travel on calenders has been reduced as much as 50%, at a very moderate expense. Much of this work has also been done in states having little or no code enforcement which is also very gratifying to note.

Safety stopping may be obtained by the use either of mechanical or electrical braking but especially in the larger capacities the electrical method has proven cheaper in first cost and more uniform and reliable in operation. The absence of any mechanical friction

or wear in the electrical system inherently gives more uniform results with a minimum of attention and maintenance.

From the standpoint of safety any braking system should be so designed and constructed that as far as possible it meets the following requirements:

1. Stop the machine as quickly as possible without undue shock or stress on any part of the equipment.
2. Withstand without injury to either the machine or braking equipment as frequent operation as may be desired.
3. Not depend on closing of electrical circuits, operation of magnets, etc.
4. Design should be such that the breaking of any wire or circuit essential to safety stopping should immediately stop the equipment upon occurrence of such failure.

Dynamic braking meets the above requirements in a very satisfactory manner. Most of the stored energy of the system is in the rotor of the motor and with the braking action developed on the rotor through the air gap the system is brought to a quick and smooth stop with no greater and often less stress on the mill gears than when starting. In view of the above conditions safety stopping may be applied as frequently as desired without fear of injury to the motor, gears or driven machines.

A general law of safety is that the failure of any protective device should become immediately evident. This is a feature rather difficult to obtain with some mechanical equipment such as fire hose, pumps, etc., and regular tests of such items are most essential. With dynamic braking, however, it is comparatively simple to so design the circuits that the breaking of a wire, the opening of a contact or other failure immediately opens the control circuit and stops the motor. This is somewhat similar to the operation of the burglar alarms on plate glass windows, stores, etc.

Dynamic Braking Problems

On synchronous motor controllers up to 550 volts contactors having an upper and lower contact as shown in Figure 1 have made a very satisfactory solution of the dynamic braking problem. With the opening of the control circuit to the upper magnet the contact spring pressure aided by gravity gives a quick closing to the lower contacts although a lower magnet coil is also provided largely to prevent bouncing and to maintain a better contact.

Oil immersed contactors of similar design are also extensively used for 2200 volt motors but oil circuit breakers are required in certain cases either for higher voltage or higher interrupting capacity.

The circuit breaker arrangement as shown in Figure 2 consists of two 600-ampere 7500-volt breakers and is a new development in connection with dynamic braking of synchronous motors. The two breakers are mechanically connected to operate from one solenoid mechanism as a 3 pole double throw breaker. A heavy coil spring normally holds the dynamic breaker closed. The energizing of the operating solenoids closes the running breaker, at the same time opening the dynamic braking contacts against the pull of the spring.

The safety switches operate in the no voltage circuit of the breaker so that failure of the control power for any reason immediately stops the motor. Since circuit breakers are ordinarily provided with a shunt trip mechanism energized from the direct current circuit this device is also used in addition to the low voltage trip thus making in effect a dual safety protection.

Tests show that the total time from the opening of the safety switch contacts to the closing of the dynamic breaker is 0.12 second which is much faster than usual breaker operation. Such control characteristics in connection with suitably designed synchronous motors provide a maximum of safety and reliability.

Stopping Time of Motors

The stopping distance or travel of any motor driven machine is made up of two portions: first, the travel obtained from the opening of the safety switch to the interruption of the motor circuit, and secondly, the travel obtained while the motor is decelerating. Until the motor circuit is interrupted the motor is operating at normal speed and the travel during a given time is approximately twice as great as that obtained during the same time when the motor is slowing down. Consequently any saving in time that may be effected in connection with the control equipment is twice as effective as a similar reduction in the time of the motor breaking.

Consider for instance a 22-inch diameter mill roll so geared that with a 600 r.p.m. motor a roll travel of 15 inches corresponds to 7.5 revolutions of the motor. With the motor operating at full speed, that is, 10 revolutions per second, if the time from the opening of the safety switch to the opening of the motor current is .2 second the motor will have made two revolutions or nearly 27% of the allowable travel before it even starts to slow down.

In connection with existing calender drives which have been modernized practically all of the improvement in stopping distance has been effected in connection with the control equipment thus not increasing the maximum braking torque already developed by the motors.

In the design of modern control, special attention is given to this item of quick operation and in order to find out just what time is required by each contactor, relay and other parts of the control equipment oscillograph records are obtained and carefully studied. Data of this kind not only makes it possible to estimate the stopping distance of new drives with greater accuracy but in the obtaining of such data the way is frequently pointed to still further improvements in the future.

Lubrex—New Mold Lubricant

A MOLD LUBRICANT that can be used on all types of molds has been introduced by the Standard Chemical Company, Akron, Ohio, under the trade name of Lubrex. For the average rubber product the manufacturer recommends a 2% water solution. The new product may also be used to treat uncured stock as it comes from the tubing machine or mixing mill to avoid flying dust, a 3% solution being recommended for this use. According to Standard Chemical, Lubrex does not build up a film in the mold and the mold cleaning operation is practically eliminated as a result. The molds "break" easily, permitting the finished products to come from them without sticking or tearing. Lubrex is said to give a sheen or gloss to the finished product, which, in many cases, eliminates the use of lacquers or varnishes. It does not discolor light colored goods, and since it is inert, does not affect the rate of cure.

Rubber in Trolley Cars

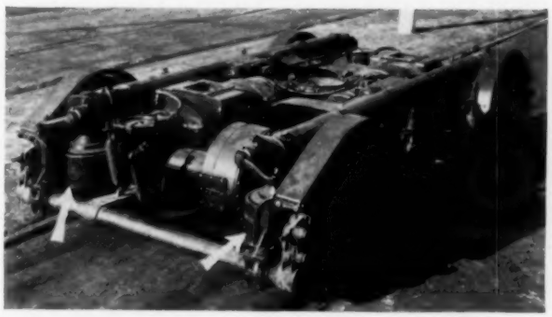
Latest Type of Modern Street Car Utilizes Rubber Springs and Rubber Insulated Wheels

MORE than 400 pounds of rubber, considerably more than goes into the average motor-truck or bus including the tires, are incorporated in the construction of the latest type of street cars, the first of which were recently placed in regular passenger service on the Smith-Coney Island line in New York City, which operates from Park Row in Manhattan to Coney Island in Brooklyn. Two new applications of rubber, both of which make for improved riding qualities and noise-elimination, feature the construction of these new trolleys which also make liberal use of rubber for general purposes.

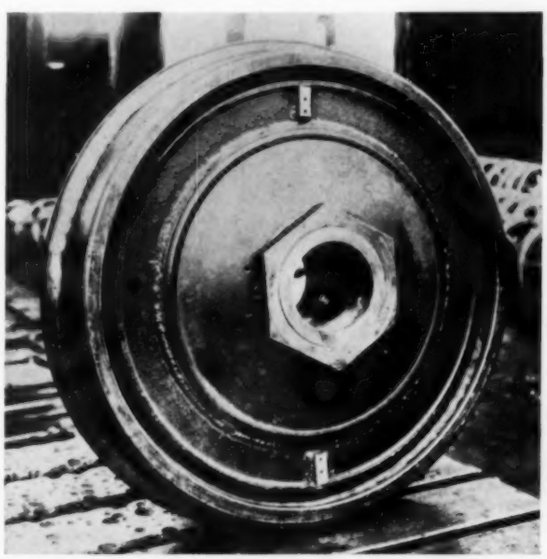
Of the front-entrance, center-exit type, the new street cars represent the culmination of six years of intensive research and experimentation financed by the street railway industry of America under the name of the Electric Railway President's Conference, now known as the Transit Research Corporation. Approximately $1,000,000 was spent in this research.

Each car seats 59 passengers, is 46 feet long, 8 feet 4 inches wide and 10 feet high from rail to top of roof, weighs 33,000 pounds and is equipped with four 55 h. p. motors, motor and control equipment being designed to provide acceleration as high as 4¾ miles per hour per second. Form-fitting seats, all arranged to face forward with ample knee-space between each one, are made with Nukraft, the latex-impregnated curled hair which forms in figure 8 loops, developed by Goodrich, and are covered with soft leather.

The two major developments featuring these new trolleys are the use of rubber springs and rubber-insulated wheels. The springs are not merely rubber mountings, it is pointed out, similar to the rubber "biscuits" used in modern automobile engine mounting, but are actually rubber springs. In this connection, James D. Tew, president of the B. F. Goodrich Company, whose engineers collaborated with those of the Transit Research Corporation, stresses the fact that "this use of rubber is unique in that it is not merely a rubber cushioning of the car trucks, but represents the actual development of springs made of rubber which perform all the functions of commonly used steel springs which they displace." Four of these rubber springs are used on each car truck and have been extensively tested for serviceability. A complete description of the springs can not be made at this time, according to Dr. C. F. Hirschfield, chief engineer of the Transit Research Corporation, Detroit, "because of the European patent situation."



Rubber springs, which replace the commonly used steel springs, support the body of the car. Arrows point to the springs.



Rubber-insulated wheel which prevents noise or vibration from telegraphing between the rails and the body of the car.

Equipped with Rubber-Insulated Wheels

In addition to the rubber springs, the new modern street cars are equipped with a unique type of rubber insulated wheel which is so constructed as to prevent noise or vibration from telegraphing between the rails and the body of the car. This insulation is obtained by use of rubber and steel discs which connect the hub with the rim of the wheel. The rubber is bonded to the steel discs by a special process, the parts being manufactured in accordance with rigid specifications laid down by the research group. This application separates the metal tire from the rest of the wheel while the hub of the wheel and the axle are also separated from the frame of the truck. The rubber parts, first of their type ever made, were furnished by U. S. Rubber Products, Inc.

To prevent rattling of frame against casing, channel rubber has been liberally used on the windows of the new cars, while rubber is also used in the springs that

support the base of the trolley pole on the car roof. There are several other applications of rubber on both the exteriors and in the interiors of these trolleys. Because of these new and novel rubber applications a practical noiseless car has resulted, one in which it is claimed that the "singing" of the overhead trolley is the loudest audible sound.

Other new features have been incorporated in the construction of the new cars including improved lighting that eliminates glares and shadows but provides high intensity of light at the proper reading plane; automatically controlled ventilation and heating; "blinker" doors that rotate to the side rather than spring back into the step well; wide windows with narrow sash to provide maximum vision for passengers; satin-finished stainless steel for interior fittings; and plentiful provision of stanchions.

Another important development incorporated into the structure of the new trolley is a magnetic track brake which operates through a magnetic shoe on the rail itself, reinforcing the air brakes on the car wheels and the electric brake on the car's motors, thus insuring quick smooth stops regardless of whether streets are slippery or dry. All three systems are controlled by one pedal.

Invitation to Increased Patronage

The special research which resulted in the development of this new type of street car was instituted primarily to produce a trolley that would be more attractive to the user and therefore would invite more passengers. A recent traffic consensus of the $5,000,000,000 urban transportation industry revealed that during the past fifteen years the number of single track miles of trolley tracks shrank from 44,199 in 1920 to 27,040 last year, while total paying passengers carried on cars in the same period decreased from 12,270,000,000 to 7,644,000,000.

With reference to the new cars, Mr. Tew recently stated that "the practicability of rubber for heavy car usage has been demonstrated experimentally and we are now going ahead in the commercial field . . . these new street cars mark the first step and I feel the day is not far away when the major railroads will follow suit, giving the country a new sensation in comfort with rubber car springs and wheels replacing steel."

In an accompanying statement, Dr. Hirschfield said: "The modern car represents a combination of features that offers the maximum in quiet power, ease of control, riding comfort and safety. It is estimated that a line operating with these modern cars, even through heavily congested areas, will be able to speed up schedules from 12 to 17 per cent."

According to Charles Gordon, managing director of the American Transit Corporation, car lines in Chicago, Pittsburgh, Los Angeles, Baltimore and San Diego have ordered nearly 400 cars of the new type in addition to the 100 which will be operated in Brooklyn.

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Tegul Vitrobond—Thiokolized Cement

RESULTING from the discovery that sulfur cements could be made many times more resistant to mechanical and thermal shock by the addition of a specially processed olefine polysulfide (Thiokol), which is soluble in sulfur and inert to acids, Tegul-Vitrobond, a new jointing material, has been introduced by the Atlas Mineral Products Company, Mertztown, Penna. It is being manufactured under license from the Texas Gulf Sulphur Company which established a Multiple Industrial Fellowship at the Mellon Institute during the course of which the Thiokolized cement was discovered.

Tegul-Vitrobond is said to possess greater bonding strength to metallic and ceramic surfaces and to have a coefficient of expansion of approximately one-third that of ordinary sulfur cements. It is inert to hydrochloric, sulfuric, acetic, lactic and phosphoric acids, and is inert to nitric acid up to 30% concentration. It is resistant to salts such as sodium chloride, ferric chloride, copper sulfate, ammonium nitrate, etc. With a tensile strength of 600 pounds per square inch and a compressive strength of 6000 pounds per square inch, Tegul-Vitrobond is said to compare favorably with acid-proof brick in these properties. It is practically non-absorbent, a test sample, immersed in water in 20% sulfuric acid for 8 months at 170° F., showing a gain in weight of only 0.52%.

The new Thiokolized cement is said to be easy to apply and ready for service immediately after it has solidified in the joints, a matter of a few minutes. Since all of its ingredients are inert to acids, it does not require definite temperature conditions or an acid treatment in order to set or harden. One important use found for Tegul-Vitrobond as a jointing material is in connection with pickling tanks.

Safe Use of Solvents

(Continued from page 158)

to ground the brush being used by winding the handle with copper wire and extending some into the bristles.

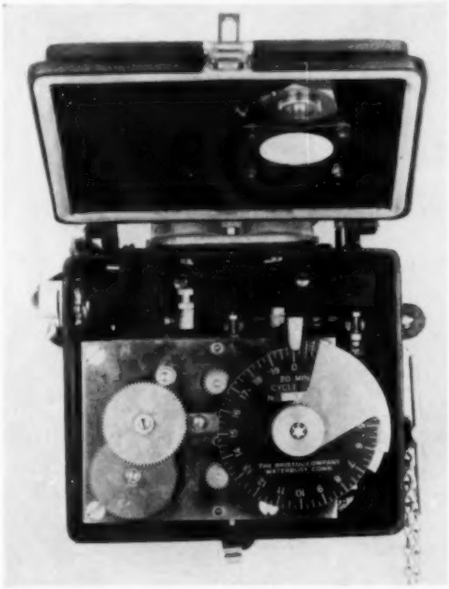
All tanks themselves should be grounded prior to activation. Since activation depends on the absorption of the gas by the rubber, after the flanges are activated or painted with carbon bisulphide, the openings must all be covered to prepare the tank for activation of the interior. The latter may be accomplished by building a metal trough on standards fairly near the top running lengthwise of the tank. A large cloth wick is laid the length of the trough. A copper tube is led in through the top opening, terminating in the trough. Carbon bisulphide liquid is poured into this copper pipe from a safety can, the spigot of which is grounded, and touching a funnel in the upper end of the tube. The evaporation of this solvent absorbed by the wick does the curing. Much care must be exercised in this process, as escape of the gas is dangerous both to individuals and as a fire or explosion hazard.

Turpentine and sunoco spirits or kerosene are used considerably in cleaning equipment, salvaging metals from rubber adhesion work. Both these solvents involve dermatitis hazards. In both cases the liquids should be used in closed containers and the fumes not allowed to escape any more than possible. Heating the liquids when speed in cleaning action is desired should be discouraged, as this increases evaporation, and pockets of this gas under proper conditions could start an explosion or fire.

New Equipment

Bristol Process Cycle Controller

ESPECIALLY adapted for use in the rubber and plastic industries, an improved type of process cycle controller, with adjustable features, has been developed by the Bristol Company, Waterbury, Conn. Known as Model 6088V the controller is equipped with one cam operating one or two leakless, three-way pilot valves, as required in the process involved. The cam is readily adjustable to carry out any desired time cycle

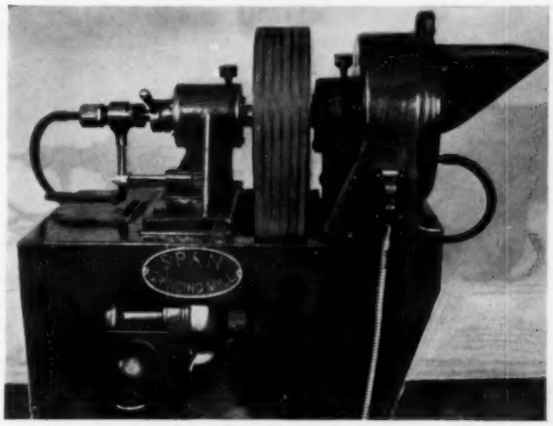


Model 6088V Controller

regardless of duration, within the range of the controller cam. This multiplicity of cycles obtainable with a single cam is made possible by a novel two-speed cam operating mechanism. The cam opens and closes the pilot valves at the desired instance during the cycle of operation. The pilot valves, in opening, allow air under pressure of from 15 to 30 pounds per square inch to flow to the top of the diaphragm valve being controlled, and in closing allow the air pressure on the valves to be released. One feature of this cycle controller lies in the fact that it is possible to automatically close the press on low pressure, hold it for a brief period at this pressure, then shift to high pressure for the balance of the cure. A cooling cycle can be introduced following the cure to chill the molds preparatory to removal. Model 6088V was designed to provide a positive and flexible arrangement whereby the cures can be altered to conform to changes necessary because of constant changes of either dies or materials, the latter applying more particularly to the plastic industry. It is self-contained and no additional apparatus is necessary to provide an infinite arrangement of cycles. The Bristol Company also produces several other types of process cycle controllers as well as a complete line of accessories.

Span Grinding Mill

DESIGNED to reduce all kinds of vulcanized rubber waste to fine powder form, as low as 40-mesh for soft stock such as inner tube, and 80-mesh for harder stock such as black tire, the Span Grinding Mill has been developed by M. Pancorbo, 155 John



Span Grinding Mill

Street, New York City. Hard rubber can also be pulverized to an extremely fine powder in this new grinding unit, as well as chemicals and other materials. The mill operates by means of disks with special grinding surfaces, all excess heat being eliminated during the grinding operation by a thorough water cooling system which permits continuous operation without the danger of overheating. Depending on the hardness of the material used and the fineness of the powder desired, the machine produces from 200 to 500 pounds per hour under 7½ to 15 h.p. It is adjustable for any fineness of powder, the rubber dust is uniform, and no screening is required. It feeds automatically and large quantities of material may be loaded at one time in the hopper or chute. No other attention is required after loading except removal of the powder at regular intervals. Made of the best materials available, according to Mr. Pancorbo, such as bronze fittings, ball bearings, 6 V-belt drive, etc., the motor is installed under the base making a complete, compact unit of the machine. Dimensions of the Span Grinding Mill are: 46 inches long, 42 inches high and 22 inches wide. It weighs approximately 1,000 pounds without the motor.

Capless Rubber Tire Valve

GUARANTEED to remain absolutely tight during the life of the tube to which it is originally attached, Jenkins Bros., Bridgeport, Connecticut, have introduced the Jenkins Capless Rubber Tire Valve. Manufactured under the F. H. Watson patents, the new valve is said to be safe because it will not rip from the tube in case of puncture but will pull through the rim hole and thus insure slow deflation of the tire until the speed of the car is controlled. Damages to tires and tubes, as well as serious accidents, may be avoided in this manner, according to Jenkins' engineers. As the name indicates, the new valve requires no cap and is made to stay tight for the life of the tube, thus eliminating the necessity of valve re-

placement parts. It is designed to fit all standard air chucks and hose connections and is constructed in such manner that it will not permit the entrance of dirt or water in the tube. Another claim made for

Jenkins Capless Tire Valve

the new valve is that its use will result in maximum tire mileage because it will keep the tire fully inflated. The valves can be refitted to tubes now in use without much expense, according to the manufacturer.

Koroseal Textile Roll Coverings

ONE of the newest applications for Koroseal, the synthetic rubber-like material developed by the B. F. Goodrich Company, is that of a textile roll covering for spinning and roving frames. Natural rubber in its various compounded forms has been tried as a textile roll covering material with poor results thus far. The Koroseal covering, however, is said to be giving satisfactory performance.

Elasticity of Koroseal, which is thermoplastic and may be molded, extruded or calendered with standard rubber machinery and equipment, may be varied over a wide range and measured in terms of

Koroseal Roll Coverings

its elongation. For textile roll coverings, Koroseal having a tensile strength of 2200 pounds per square inch at 70° F. was selected. The first test installation of these coverings was made in December, 1935, on the cots of a spinning frame. These cots have been in use approximately 120 hours per week since that time and recent examination showed their drafting surface to have stood up remarkably well, according to Goodrich.

Koroseal cots are currently running on a few test frames in several textile mills manufacturing different kinds of thread. Preliminary tests on spinning and roving frames, using these cots, have shown equal or greater tensile strength in the finished yarn, superior resistance to wear or grooving, little lick-up of fibers, no chemical deterioration on standing and ease of assembly or installation on arbors. Grinding and preparation of the synthetic rubber-like cots' surface is said to be simple, requiring very little equipment.

Termed inflammable, since it will burn only when held in direct contact with flame, Koroseal can be processed to yield tensile strength up to 7500 lbs./sq./in. In its uncompounded form it is translucent; the natural color, which has no bearing on its physical properties, varies from pale amber to dark brown. It is described as one of the most highly water repellent, flexible materials known, one that does not swell in oil and as a good electrical insulating material. In flexing tests duplicating the active service for which Koroseal and natural rubber units were designed, the rubber is said to have failed under 300,000 flexures, while the Koroseal units were still serviceable after 3,000,000 flexures.

According to Goodrich engineers, the Koroseal textile roll coverings are proving superior to other materials for some types of drafting, both from the standpoint of longer life and ability to produce better yarn. Introduction and adoption of these new coverings may also influence future textile operations by putting into actual commercial use spinning processes which heretofore appeared impractical due to the lack of a suitable roll covering material.

Change of Volume of Rubber

WHEN rubber is stretched to a relatively high elongation it undergoes fibering and many of its properties change from those of an amorphous to those of a crystalline material. A time lag in the fibering as indicated by a lag in the development of the X-ray diffraction pattern and the double refraction of stretched rubber has been discovered by earlier investigators. In a new investigation, conducted by W. L. Holt and A. T. McPherson, U. S. Bureau of Standards, the same time lag was found by precise measurements of the change of volume on stretching. Complete results of the investigation are contained in Research Paper 936 in the November, 1936, issue of the *Journal of Research*, published by the Bureau.

When rubber containing no coarse fillers was stretched under ordinary circumstances the volume remained constant up to an elongation of 200 or 300%, above which it decreased by an amount which became greater the higher the elongation, the lower the temperature, or the longer the time the rubber was held in the stretched condition. One compound, at an elongation of 600%, showed a decrease in volume of 1.2% at the end of 1 minute, while after 3 weeks the decrease in volume was 1.8%. But even at the end of the 3 weeks the volume was decreasing as a linear function of the logarithm of the time, and gave no indication of approaching a limit.

These observations indicate that Poissons' ratio for rubber, in the absence of coarse fillers, is 0.5 or slightly greater, and depends for its precise numerical value upon the elongation, the temperature, and the time after stretching.

Book Reviews

Diseases and Pests of the Rubber Tree. By Arnold Sharples. Published by The MacMillan Company. 480 pp. $8.75.

Published by the London branch of MacMillan (and available through the American branch at 60 Fifth Avenue, New York), this book is divided into three parts, e.g., General Remarks on Plant Diseases, Structure, Reproduction and Physiology of Fungi; Form and Function; and Diseases and Pests, any one of which may be read independently of the others. Although the subject matter for the most part presents intricacies to the layman, the author has taken every care to give the simplest and barest outlines compatible with utility. As the late head of the Pathological Division, Rubber Research Institute of Malaya, and formerly Government Mycologist, Department of Agriculture, S.S. and F.M.S., Dr. Sharples is well qualified to handle the subject which is largely based on the results obtained at the R.R.I. since 1931. Although written for embryo and experienced planters the book should prove of interest to those interested in the general subject of crude rubber.

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A.S.T.M. Standards—1936. (In Two Volumes). Published by the American Society for Testing Materials, 260 South Broad Street, Philadelphia. Blue cloth binding. Either volume, $7.50; both volumes, $14.00.

These standards are issued triennially, and are supplemented by annual compilations. The 1936 issue comprises two volumes, Volume I giving in their latest form all A. S. T. M. standards covering metallic materials and Volume II giving those relating to non-metallic materials including rubber products, electrical insulating materials and waterproofing materials. In each volume the specifications for a particular class of materials are given first, followed directly by the test methods, definitions, etc. A complete subject index lists each standard with the keywords in alphabetical sequence. The index, plus two tables of contents, one listing standards by materials covered, the other in order of sequence of the serial designations, facilitates the use of this edition. Volume I covers 181 standards; Volume II, 335 standards. Both volumes aggregate 2,400 pages.

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A.S.T.M. Standards on Electrical Insulating Materials. Published by the American Society for Testing Materials, 260 South Broad St., Philadelphia, Pa. 326 pp. $2.00.

The 1936 edition of these standards contains 25 methods of test and 10 specifications and includes a number of revised test methods covering the following: varnishes, solid filling and treating compounds, sheet and plate materials, natural mica, untreated paper, insulating oils and varnished cloths and tapes. Revised specifications appear on friction tape, black bias cut varnished tape, and asbestos yarns, tape and roving. Prepared by Committee D-9 on Electrical Insulating Materials, this latest edition of the standards also includes the 1936 report of that Committee and outlines the research and standardization work currently being carried on.

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A.S.T.M. Standards on Textile Materials. Published by the American Society for Testing Materials, 260 South Broad St., Philadelphia, Pa. 296 pp. $2.00.

In addition to all A.S.T.M. standards on textiles (42 in all) this revised and amplified edition, sponsored by Committee D-13 on Textile Materials, includes a proposed potassium dichromate oxidation method for the determination of total iron in asbestos textiles, a psychrometric table for relative humidity, a section comprising many excellent photomicrographs of common textile fibers and a convenient yarn number conversion table. For the first time new methods of testing, applying to pile floor covering, fineness of wool, corded cotton gray goods, among others, are presented. Changes in standards since the 1935 edition are also included.

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Flow Meter Engineering Handbook. Compiled and edited by Louis Gess and J. O. Feldmark. Published by The Brown Instrument Co., Philadelphia, Pa. 164 pp. $2.00.

With the object of familiarizing its readers with the correct design, installation and operation of flow meters, this book covers every phase of flow meter engineering—principles, designs, applications, installations—with the data covering all types of fluid measuring equipment using the orifice. The subject is treated with in six divisions, viz.: General Flow Meter Engineering, Orifice Design, Steam Flow Measurement, Water Flow Measurement, Liquid Flow Measurement and Air and Gas Flow Measurement. All theory is illustrated with charts, photographs and sample problems similar to those encountered by power and process engineers.

Booklets, Catalogs, etc.

Deproteinized Rubber. (A reprint). By C. R. Boggs and J. T. Blake. Published by Simplex Wire and Cable Company, Boston, Mass. 8 pp.

Reprinted from the October, 1936, issue of *Industrial and Engineering Chemistry*, this article treats with deproteinized rubber, made from specially-treated cultivated rubber, the special virtue of which is its low water absorption and the electrical stability it imparts to vulcanized rubber compounds immersed in water. History, composition, properties and method of manufacture are some of the topics covered in the article.

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The Genus Hevea—Mainly the Brazilian Species. (A reprint). By Adolpho Ducke. Published by Y. G. Aranjo and Co., Manaos, Amazon, Brazil, S.A. 36 pp.

Reprinted from the December, 1935, issue of the *Archivos do Instituto de Biologia Vegetal*, this article presents the results of a study on the natural system of the Amazonian rubber trees according to observations made in the field and not only on the herbarium samples accepted by most botanists. The various types of *Hevea* trees in the Amazon valley are named, locations given and each discussed as to its commercial value.

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Facts About Akron. Greater Akron Association, First Central Tower, Akron, Ohio. 20 pp.

This booklet contains reprints of the first seventeen newspaper advertisements which have been published by the Greater Akron Association, an impartial organization recently formed to "foster the best interests of the people of Akron." The advertisements point out the benefits accruing from operating in the Akron district and cover a variety of other subjects as well.

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Machine-Made Jobs. Machinery and Allied Products Institute, 221 North La Salle St., Chicago. 14 pp.

Third of a series prepared by the Institute, this report continues the presentation of factual evidence that "jobs are created by the advance of science and invention." Additional examples, such as the development and adaptation of dial telephone systems, mechanical refrigeration, sound pictures, linotype machines, are given with employment figures quoted for the respective industries.

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Rubber Mill Machinery. Wm. R. Thropp and Sons Co., Trenton, N. J. 16 pp.

The complete line of individual motor-driven mills, warmers, crackers, refiners and washers, made by Thropp, are described and illustrated in this catalog. The features of each type machine are discussed, with complete specifications being given in each instance.

Editorial Comment

Merry Xmas

To its many friends in the rubber and allied industries, THE RUBBER AGE again extends its very best wishes for a Merry Christmas and a Happy New Year.

THE PUBLISHERS

Stabilize Crude Rubber Prices

FOR THE FIRST TIME since 1929, the price of crude rubber has passed the 19-cent mark, and by every present indication will reach higher brackets in the next few months. This rise in prices is due almost solely to the regulations and restrictions imposed on signatory countries by the International Rubber Regulation Committee. The unannounced and unofficial goal of this committee has been reached, viz.: a spot price for crude rubber sufficient to enable profits for the producers. Reaching of allied goals—limited production, decline in world stocks, consumption increase—has caused the price rise.

Now that crude rubber prices have passed the 19-cent mark, it would seem that the time has arrived for the International Rubber Regulation Committee to consider more carefully and more fully the effect of their past decisions on the manufacturers who consume the raw material. Additional price increases in crude rubber would certainly make it increasingly difficult for many manufacturers, particularly smaller manufacturers, to compete with their larger competitors. It might even result in forcing many small manufacturers to close their doors—especially if there occurs any even mild skyrocketing of prices.

Crude rubber prices are still rising. There is no assurance that the rise may not get temporarily out of the Committee's power to control. Only eleven years ago, in 1925, the average price per pound for the year was 72.46 cents, and just as small manufacturers suffered on the rise, the stronger companies took an equal beating on the subsequent decline. Something should be done—and done now—to avert any similar occurrence. It is time to call a halt to restriction of cultivation alone, and give some thought to price stabilization.

Rubber manufacturers do not solicit a low price on crude rubber. Nor do they favor a high price. They most emphatically prefer—and merit—a reasonable and not unstable price. According to carefully considered estimates, a price of 16 to 18 cents a pound on crude rubber would enable efficient plantations to pay excellent dividends after providing for depreciation, replanting gradually, and all other expenses.

Price stabilization around that figure should certainly satisfy plantation investors, privately-owned cultivation projects and other interests. It would be a move in the right direction, although it might and would be heavily frowned upon by market speculators. Particularly would small rubber manufacturers receive such stabilization with open arms. As a good and steady customer, the rubber manufacturer warrants this consideration.

In the same manner that the International Rubber Regulation Committee achieved restricted production, increased consumption, smaller world stocks, and thus higher prices, so now must it assure reasonable price stability. The need is imperative; the method is unimportant; the result would be a gratifying increase of confidence in the capacity and dependability of the International Committee.

Mutual Company Raises Problems

ORGANIZATION of a mutual sales company by U. S. Rubber Products, Inc., to take over all existing and future business on all brands of U. S. tires, leaving original equipment tires and private brand tires to the parent concern, not only should have a beneficial effect on price stabilization in the industry but should also act as a safeguard for the parent company where the Robinson-Patman Act is involved. If nothing else, the Federal Trade Commission may find it has another problem to solve in the event that certain events come to pass.

For instance, if the FTC holds that the private brand business done by the parent concern competes with its sales to the mutual company—who is to be held responsible, the manufacturing division or the sales agency? According to interpreters of the law, the sales agency alone would be involved on any question of discrimination, and not the parent concern. In the event that the sales agency discriminated among dealers it would certainly be held responsible and not the parent concern, but would not the question arise as to whether the agency was merely a subterfuge or was independent of the manufacturer?

Creation of the new concern also raises another interesting point, i. e., if the mutual concern sold to all its dealers at the same price, regardless of quantity, and then at the end of the year divided the profits or savings among the mutual dealers on the basis of their respective volumes, would this be within the law?

Since announcement has been made that the mutual sales plan is dependent for future operation upon results ascertained in a one-year period, its formulators probably had in mind the possibility that it might have to stand up under the FTC's scrutiny and probably would be involved in a test case to prove its validity under the terms of the Robinson-Patman Act.

CURRENT • NEWS
of the Rubber Industry

DECEMBER, 1936

U. S. Rubber Organizes Mutual Sales Company To Conform to Robinson-Patman Requirements

New Sales Agency Will Take Over Complete Distribution of All U. S. Brands of Tires Including the 28 Company-Owned Stores, Federal and Tire Mileage Contracts, Etc.

A NEW special sales agency, in the form of a mutual company, has been organized by United States Rubber Products, Inc., "to meet changing conditions in business" and also "in order to more clearly conform to new legal requirements." The new concern will be known as the U. S. Tire Dealers Mutual Company, and will be given a one-year trial. Although not specifically mentioned in a statement signed by L. D. Tompkins, vice-president of the Tire Division, the new organization was created to insure compliance with the provisions of the Robinson-Patman Act and to stabilize retail prices. It represents the first of a series of inevitable moves on the part of the larger tire manufacturers to escape liabilities imposed by the measure. The new plan is effective January 1, 1937.

As soon as the formalities of organization permit it, U. S. Rubber Products, Inc., will enter into a signed agreement with the new concern. This agreement will incorporate eight specific points, as follows:

1. Commencing January 1, 1937, all U. S. dealers will be supplied with U. S. brands of tires by the U. S. Tire Dealers Mutual Company instead of U. S. Rubber Products, Inc., as at present.

2. The Mutual company will obtain its tires from U. S. Rubber Products, Inc., and will have the same purchasing advantages as any other volume purchaser in the replacement field, i.e., it will buy its tires at the same percentage above manufacturing costs as will other large volume accounts, although there will be no allowance for volume in that cost.

Takes Over Company-Owned Stores

3. The Mutual company will take over the operation of the 28 company-owned stores and all other contracts relating to U. S. brands of tires in the replacement field together with all required facilities, inventories and accounts at their cost. The parent concern will continue to finance the cost of distribution by lending the Mutual company the necessary funds but will charge legal interest rates. Certified public accountants will testify as to the accuracy of annual financial statements.

4. The Mutual company will perform all of the usual functions of a sales organization, such as selling, shipping, warehousing, sales promotion, advertising, etc., and will use the U. S. system of distribution, including the personnel.

5. As at present, the Mutual company will distribute its tires through U. S. dealers at prices based on established lists and discounts therefrom.

6. The Mutual company will select dealers from different parts of the country to serve as an Advisory Council on matters of distribution.

Provides for Further Payments

7. For the first time in dealer history, a formula for further payment, if earned under certain conditions, will be established. These conditions are: (1) in the event that at the end of a fiscal year it is found that the cooperative efforts of the dealers and the Mutual company have reduced expenses to a point where a fund or surplus remains, then that fund, after setting up sound business reserves, will be distributed on a mutual basis among the dealers; and (2) Price wars must be avoided since conditions unfavorable to the accumulation of that fund, beyond the control of the Mutual company, would adversely affect possible further payments.

8. The Mutual company may continue the plan for further periods with the understanding that there may be modifications required by changes in the laws or for mutual advantage.

One interesting aspect of the revolutionary plan is that it divorces U. S. Rubber Products, Inc., from all direct connection with retail distributors. When the plan goes into effect, the parent concern will have three types of customers: the automobile industry on original equipment tires; the new Mutual concern; and private brand contracts. It will be recalled that only two months ago U. S. Rubber Products absorbed all the business of the Atlas Tire Company.

An important angle forecast by adoption of the plan lies in the fact that dealers are given an actual incentive to avoid price wars since price stabilization in the replacement field will result in larger earnings to the Mutual company with "melons" or dividends returned to the dealers at the end of the year. Independent dealers especially will profit from the plan, since the profits absorbed from municipal, state and Federal contracts, as well as tire mileage contracts, go into a single fund computed at the end of the year.

U. S. Seeks Injunction

An infringement suit brought by the United States Rubber Company against the Sidney Blumenthal Company was heard on December 4th by Judge Huncks in the United States District Court, New Haven, Conn. U. S. Rubber alleges the Blumenthal concern is violating three basic latex patents which it owns and controls, and is seeking an injunction to prevent their continued use. A decision, which is expected to have wide-spread effect, is expected momentarily.

Shift Aetna Officials

S. T. Campbell, formerly president of the Aetna Rubber Company, Cleveland, Ohio, resigned that office last month, and T. J. Calhoun, chairman of the board, has assumed the added duties of president. Following Mr. Campbell's resignation, M. C. Teasdale was elected active secretary-treasurer of the company, and McConnell Shank was named vice-president and general manager. The latter has had many years of experience with rubber manufacturers in the Akron area. Mr. Campbell, who has rejoined the Faultless Rubber Company as vice-president and general manager, remains an Aetna director.

MANUFACTURERS GRANT BONUSES AND RAISES

Accompanying the recent flood of dividends and extra dividends, several rubber manufacturers have announced special bonuses and wage increases for employees. Both Kelly-Springfield and Fisk announced wage adjustments about October 15th, and since that date several divisions of U. S. Rubber Products, Dayton Rubber, Mansfield Tire and others have followed suit.

Approximately 5,000 workers in the U. S. Rubber footwear plants at Naugatuck, Connecticut, received an increase in wages on November 27th, while at the Providence (R. I.) plant some 2,000 employees had their salaries raised effective November 30. In addition to wage increases averaging 8%, totaling $150,000 annually, A. L. Freedlander, president, Dayton Rubber Manufacturing Company, announced a week's vacation with pay for factory workers effective January 1, 1937.

A wage increase averaging 5% was granted by the Mansfield Tire and Rubber Company to its 950 employees, in addition to bonuses aggregating $75,000 which were to have been paid on December 15. The increase, which will boost the company's payroll by $85,000 to $90,000 annually, becomes effective January 1. Another company to grant an increase was the Mishawaka Rubber and Woolen Manufacturing Company, the increase ranging up to 10% for some employees.

REVERSE DECISION ON FREDERICKSON PATENT

On Monday, November 9th, the U. S. Circuit Court of Appeals for the Second Circuit, handed down an opinion written by Judge Learned Hand, declaring the Frederickson Patent on "Safecote" rubber covered wire invalid. The patent is the property of the National Electric Products Company, Pittsburgh.

Several months ago National Electric filed suit in the U. S. District Court, Eastern District of New York, against the Circle Wire and Cable Corporation, New York City, charging infringement of the Frederickson Patent. At that time Judge Inch upheld the patent and declared the defendant was infringing. Circle appealed this decision which was subsequently reversed by Judge Hand who dismissed the suit against the defendant.

According to S. Gottfried of the Circle Wire and Cable Corporation, the decision of the Circuit Court is of tremendous importance to the entire rubber covered wire industry since a license had been extended to eighteen manufacturers by National Electric, including leading manufacturers of the industry. Litigation began when Circle refused to accept a license and started to manufacture its own product.

Coming Events

December 18. New York Group, Rubber Division, A.C.S. (Xmas Party). Building Trades Club, 2 Park Avenue, New York City.

December 18. Chicago Group, Rubber Division, A.C.S. (Xmas Party). Hotel Sherman, Chicago.

January 5. Los Angeles Group, Rubber Division, A.C.S. Los Angeles Athletic Club, Los Angeles.

January 15. Akron Group, Rubber Division, A.C.S. Akron City Club, Akron.

April 12-15, 1937. Rubber Division A.C.S. Chapel Hill, North Carolina.

September 13-17, 1937. Rubber Division, A.C.S. Rochester, N. Y.

FIRESTONE PURCHASES FACTORY AT MEMPHIS

Firestone Tire and Rubber Company, Akron, has purchased a factory at Memphis, Tennessee, formerly used for the manufacture of automobile bodies. The factory, which was owned by General Motors, is rapidly being equipped for tire production, present plans calling for a production of 200 tires a day. According to Firestone, the Memphis plant was purchased "to give quicker distribution in the Southern states."

With the purchase of the new plant, Firestone now has three domestic factories, i.e., at Akron, Los Angeles and Memphis. Although only 200 tires a day will be produced at Memphis for the next few months, the plant is being equipped for 2,000 tires a day capacity. The production rate will be stepped up as increased sales warrant.

Davis Appointed Chairman

Francis B. Davis, Jr., president, United States Rubber Company, has accepted an appointment as chairman of the committee of members of the rubber industry which will participate in the campaign to sell $27,829,500 of debenture bonds to finance construction of the New York World's Fair. The committee headed by Mr. Davis is one of sixty-eight volunteer groups. The Fair is scheduled to open on April 30, 1939, in the Borough of Queens, just outside of Flushing, Long Island, N. Y.

Charles Goodyear Acclaimed

A special committee, consisting of prominent individuals, last month named Charles Goodyear one of the 12 greatest American inventors, a few others being Robert Fulton, Samuel Morse, Thomas Edison and Orville Wright. The list was made public in connection with a banquet held in Washington, D. C., to celebrate the 100th anniversary of the American patent system.

NAME INFRINGEMENT CHARGED TO SINCLAIR

In a suit filed on November 10th in the Federal Court at Cleveland, Ohio, the Sinclair Refining Company charged the Sinclair Rubber Products Company, of Cuyahoga Falls, Ohio, with infringement of trade name and the symbol "HC". The petroleum company alleges that the rubber concern is capitalizing on the "Sinclair" trade name and symbol, both of which were "built up at great cost." The petition asks for damages of a minimum of $3,000, an accounting of the firm's business, and an injunction against further use of the name and symbol.

S. J. Gottlieb, president of the Sinclair Rubber Products Company, stated that his company's name is properly registered and that the use of the symbol "HC" signifies "heavy construction." Although the rubber company has retained attorneys to fight the charges, no brief has yet been submitted to the Federal court.

GOODYEAR ACQUIRES FACTORY AT JACKSON

The Goodyear Tire and Rubber Company, Akron, on December 10, exercised its option on the old Kelsey-Hayes Company automobile wheel factory at Jackson, Michigan, and will turn it into a tire producing plant. Goodyear officials stated that production would be started only on a limited basis sufficient to slightly supplement the original equipment tire business at the Akron factories, although a capacity of 5,000 tires per day will be provided for.

It has been pointed out that the Jackson location is a desirable site for a tire factory because of its proximity to automobile plants in Detroit, Flint, Lansing and Pontiac. The plant has been practically idle since Kelsey-Hayes moved its major manufacturing activities to Detroit several years ago, although some production had been maintained at Jackson.

General Dyestuff Moves

All departmental activities of the General Dyestuff Corporation are now coordinated under one roof in a newly-erected nine-story building located at 435 Hudson Street, New York City. The new construction provides for the addition of three extra stories if necessary in the future. Many of the wall partitions in the new building are of the new structural glass brick.

Change Company Name

Rubatex Products, Inc., has changed its corporate name to the Virginia Rubatex Corporation. The company maintains a plant in Bedford, Virginia, and has storage facilities at 1 Exchange Place, in Jersey City, N. J.

BOSTON RUBBER GROUP ELECTS NEW OFFICERS

Election of officers and presentation of two interesting technical papers featured the meeting of the Boston Group, Rubber Division, A.C.S., held at the Hotel Kenmore, in Boston, on November 24th. Following a report from the secretary-treasurer, the following officers for the 1936-37 season were elected: Chairman, Royce J. Noble, consulting technologist; Secretary-Treasurer, G. W. Smith, the Barrett Company; Executive Committee, J. T. Blake (Simplex), R. B. Huber (Litter), and E. A. Krisman (DuPont). Dr. Noble was formerly secretary-treasurer of the group, while the retiring chairman, J. T. Blake, becomes a member of the Executive Committee.

Morss Delivers Address

Although Dr. J. R. Katz, of the University of Amsterdam, Holland, was scheduled to deliver a paper on "The Structure of Highly Polymerized Substances," illness prevented his appearance. Henry A. Morss, Jr., son of the late Henry A. Morss, who was president of the Simplex Wire and Cable Company at the time of his death, substituted for Dr. Katz and delivered a paper on the "Stretching of Rubber." The second paper was "Carbon Black," by Dr. I. Drogin, of J. M. Huber, Inc.

Mr. Morss discussed changes in the form of the rubber molecule during stretching, claiming that the interactions of hydrogen pairs during rotations on the single bonds are not Van der Waals forces of attraction, as Mack has supposed, but are in fact repulsions. He stated that new X-ray diffraction studies of the crystals in stretched rubber have shown that the generally accepted form of the unit cell is not correct, and went on to say that change in the unit cell opens the possibility of resolving the well-known discrepancy between measured and calculated values of the density of the crystals.

Drogin Discusses Carbon Black

In his paper Dr. Drogin stated that there are six commercial methods for manufacturing carbon black, of which the channel process is the most important. He revealed some interesting statistics, i.e., that Texas supplied 81% of carbon black production in the United States in 1935; that the rubber industry absorbed 214,000,000 pounds, or 87% of the total domestic sales in that year, the ink industry absorbing slightly over 6%; and that approximately one-third of our production is exported.

Discussing carbon black manufacture, Dr. Drogin stated that nitrogen and sulfur content determine the suitability of natural gas for the manufacture of black and that gas rate, tip design, tip spacing and draft conditions are some of the factors which influence yield, color and quality of black produced. Rubber grade blacks are examined for percent grit, moisture, bulk (of the dustless type of black), sulfur, volatile matter and accelerator adsorption.

Ease of mixing and degree of dispersion, continued Dr. Drogin, are determined by examining stocks of rubber and black mixed in a Schiller internal mixer equipped with Banbury type blades. T-50 tests for state and rate of cure, resiliency test made with a rebound impact machine, heat and blowout resistance test made with the St. Joe Flexometer, and abrasion tests on green and bomb aged stock are of considerable importance in evaluating carbon blacks.

DR. NOBLE ADDRESSES RHODE ISLAND CLUB

Dr. Royce J. Noble, latex consultant, was the principal speaker at the winter meeting of the Rhode Island Rubber Club, held on December 11 at the Narragansett Hotel in Providence, R. I. Prior to the usual dinner, a bowling tournament was held at the Washington Alleys with prizes awarded to winners in the contests.

For his subject, Dr. Noble selected "Recent Developments in Latex Technology" and described these developments briefly but completely. Author of "Latex in Industry," the speaker was well qualified to handle the subject and found an appreciative audience. An article based on this speech will be found elsewhere in this issue.

Following this presentation, Dr. Lester Round, former Health Officer and State Criminologist for Rhode Island discussed "The Use of Scientific Methods in the Detection of Crime." He mentioned several of these methods and pointed out criminal cases in which they were used.

CHICAGO HAS MEETING; PLANS XMAS FESTIVAL

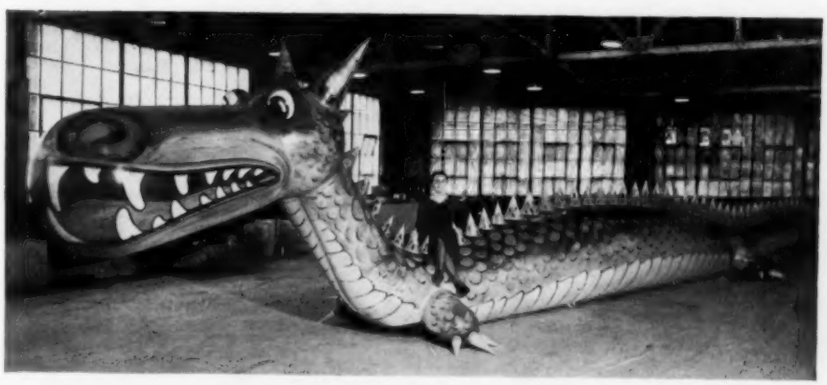
The first technical meeting of the Fall season of the Chicago Group, Rubber Division, A.C.S., was held on November 13th at the Hotel Sherman in Chicago. Jacob Kirschner, chief chemist, Dryden Rubber Company, presided as chairman. Preceding the technical meeting, a lavish dinner was served.

Presenting the only paper of the evening, Arthur W. Carpenter, manager, Physical Testing Laboratories, B. F. Goodrich Company, Akron, spoke on "Ageing Methods." He discussed in detail the various types of apparatus that may be used in making physical tests and rate of deterioration tests on rubber compounds, and by means of samples showed the effects on various compounds before and after ageing. In addition to outlining modern methods of ageing tests, Mr. Carpenter also traced the development of the tests from the earliest crude attempts.

An unexpected visitor at the meeting was Simon Collier, formerly of the Waukegan plant of the Johns-Manville Corporation, now stationed at the New York headquarters of the company where he is in charge of all inspection and control work. Mr. Collier was chairman of the Chicago Group in 1933 and 1934 and was an active worker, originating many of the group's present plans and policies.

The annual Christmas meeting of the group is scheduled for Friday, December 18th, also at the Hotel Sherman, but no further details are available at this writing other than that it will be "a most unusual meeting."

RUBBER DRAGON FEATURED IN MACY PARADE



150 feet long, this rubber dragon, when deflated, can be packed in a wardrobe trunk.

The annual Thanksgiving Day parade held by R. H. Macy and Company, New York City's largest department store, held this year on November 26th, again featured a variety of rubber figure-balloons. One of the newer creations to appear was a rubber dragon, reminiscent of the St. George fable, which measured 150 feet from nose to tail. These figure-balloons are built of the same materials and in the same manner as their more practical and conventional predecessors in military and commercial aviation, many of them, including the rubber dragon (illustrated above) being produced in the balloon room of the Goodyear Tire and Rubber Company, at Akron. The larger balloons are made for inflation with helium, the smaller figures, as a rule, being designed for air inflation and are either carried or mounted on trucks for parade purposes.

L. A. RUBBER GROUP NAMES HILL CHAIRMAN

T. Kirk Hill, president, Kirkhill Rubber Company, was elected chairman of the Los Angeles Group, Rubber Division, A.C.S., at the regular supper meeting of the group, held on December 1st, at the Los Angeles Athletic Club. Sixty-three members and guests were in attendance. Mr. Hill has taken a keen interest in the affairs of the group and succeeds G. G. Balazs of the Goodyear Tire and Rubber Company. Other officers elected were Arthur Wolf (N. J. Zinc) as vice-chairman, succeeding Ed Royal (H. M. Royal), and Carl Stentz (E. N. Smith Co.), who succeeds himself as secretary-treasurer.

Two Speakers on Program

The two main speakers for the evening were L. E. Wood, California Institute of Technology, and Judge Le Roy Dawson of the Los Angeles Municipal Court. Mr. Wood's talk was a detailed description of methods used in collecting stratosphere data, largely for weather forecasting, by means of specially-made rubber balloons. He pointed out that the development of more accurate long-time weather forecasting is directly related to the development of the rubber industry since improvement in serviceable rubber balloons has greatly reduced the cost of stratosphere investigations.

Radio development, according to the speaker, has been the second important feature in more accurate weather forecasts, special radio apparatus developed at the California Institute of Technology now being sent up with the balloons. The miniature apparatus, during the ascent of the balloon, reports on temperature, atmospheric pressure and humidity every few seconds. Rubber has replaced paper and other materials in stratosphere balloons, the speaker said, primarily because balloons made of rubber can expand to large diameters during ascendancy when the atmospheric pressure gradually lessens. Specimens of both the balloons and the radio apparatus were shown by Mr. Wood.

Jurge Dawson's talk was non-technical and was delivered in a humorous vein, describing his experiences in France during the War and his subsequent experiences on the bench. The talk was well received.

Door Prizes and Souvenirs

A special prize—a 20-pound turkey—was won by Ed Royal, and first, second and third door prizes, i.e., a smaller turkey, a subscription to *Life* and a set of golf balls, were won by V. G. McElroy, James W. Stull and W. R. Hucks, respectively. The door prizes were donated by the C. P. Hall Company through Bob Abbott while the special turkey prize was given by Charles A. Kipple, representative of the San Francisco Sulphur Company. Individual cigarette lighters, as souvenirs, were donated by the Binney and Smith Company, through Martin, Hoyt and Milne, Inc.

The large silver trophy which has served as an inspiration for the past several annual golf tournaments was formally presented to James W. Stull (Santa Fe Rubber Mills) who recently

New Binney & Smith Trophy for L.A. Golf Tournaments

won permanent possession of it. This trophy had been beautifully refinished by the original donors prior to presentation to Mr Stull. The new trophy, for which golfers will contend in the future, was also displayed at the meeting. Donated by Binney and Smith through M. Montgomery of Martin, Hoyt and Milne, the new trophy (reproduced herewith), is of gold, stands 36 inches high and is surmounted by the figure of a golfer.

The next meeting of the group will be held on Tuesday, January 5th, also at the Los Angeles Athletic Club.

Goodyear May Purchase Mines

According to report, the Goodyear Tire and Rubber Company, Akron, may soon close a deal for the Provident and Fairpoint coal mines, located at St. Clairsville, Ohio. Officials of the company inspected the property last month although no statement was forthcoming from the management. The mines, owned by the Clarkson Coal Company, have been closed down for the past five years. Goodyear operates the Deep Shaft Mine, near Adena, Ohio.

Hamlin Machine Moves

The Hamlin Machine Company, well known manufacturers of clicking, skiving, cutting, eyeletting and dieing out machines, used in rubber footwear plants, has just moved from Lynn, Mass., to larger quarters at 67 Maplewood Street, Malden, Mass. N. W. Mather is owner and general manager.

XMAS PARTY PLANNED FOR NEW YORK GROUP

The Annual Xmas Party of the New York Group, Rubber Division, A.C.S., will be held on Friday night, December 18th, at the Building Trades Club, 2 Park Avenue, New York City, with activities scheduled to start at 6:30 p. m. The program consists of two instructive talks, election of officers for 1937, distribution of prizes donated by various companies and suitable entertainment throughout the evening.

An instructive talk on "Modern Methods of Curing Rubber Articles," which will be liberally illustrated with motion pictures on the latest types of vulcanizing equipment, will be given by Walter P. Voth, of the Akron Standard Mold Company. This will be followed by a presentation by Harry I. Day, motion picture expert, of "Ultra Slow Motion Pictures in Science and Industry", a specially prepared film showing how slow motion pictures are used to solve many technical and mechanical problems in various industries.

In addition to these two educational and instructive features, special entertainment will be offered by Jack Whitehead, Seamless Rubber Company, who has earned an enviable reputation as "The Wizard of the Accordion—from Berlin to Beethoven." Other surprise entertainment features will also be presented during the evening.

As usual tickets are $2.50 each, including dinner and lucky numbers, and may be secured from Peter P. Pinto, secretary-treasurer, c/o THE RUBBER AGE, 250 West 57th Street, New York City. Because the club rooms permit a capacity of only 300, it is suggested that tickets be purchased promptly or reservations (which may be paid for at the door) be made with the secretary-treasurer of the group.

India Tire Deal Pending

Although the plant of the India Tire Company, at Mogadore, Ohio, has not yet been sold or dismantled, several deals are pending, according to Sidney Albert, general manager of the Akron branch of L. Albert and Sons, dealers in rubber machinery and equipment who purchased the complete plant from the Reconstruction Finance Corporation recently. It is believed that the factory will be sold intact to a single buyer.

Define Labor Policy

In a series of full page newspaper advertisements under the broad heading of "Goodrich Policy of Industrial and Public Responsibility", the B. F. Goodrich Company, Akron, recently defined its labor policy to its employees and to the Akron public. According to T. G. Graham, vice-president, the reaction to the campaign was immediate and wholly favorable, not only in Akron, but on the part of labor officials and industrialists in other centers.

Rubber Industry Records Increased Output In Various Divisions for Last Six Months

Periodical Dun Survey Reveals Appreciable Gains in Rubber Heel, Footwear, Raincoat and Several Other Divisions, with Mechanical Goods Leading All Fields

GAINS recorded in both production and distribution of rubber products since the first quarter of the current year have permitted establishment of six-year peaks in several divisions of the industry, including rubber heels, footwear and raincoats. The demand for retail rubber goods was particularly good as retailers increased their orders from 20 to 40% over the previous year to stock up depleted shelves. The bulk of the increase was contributed by mechanical rubber goods. These developments are covered in the periodical survey conducted by Dun and Bradstreet, Inc., the latest of which has just been made available by the organization.

Larger output in all divisions was revealed by the expanding consumption of crude rubber, which set a new all-time high record, while total world stocks at the end of August were the smallest for any month since December, 1929. As automobile tire production for the eight months reached 37,705,078 units, or 12.6% more than in 1935, output for 1936 has been estimated at 53,000,000 units, the largest since 1929, when 68,726,000 were turned out. While original equipment sales will strike a new peak, sales of replacement tires will show a decline for the eighth year.

All Branches Record Gains

Manufacturers in all branches of the rubber goods industry recorded production ahead of that of 1935, with demand spreading to nearly every item. The increase over the previous year's comparative advanced from 10 to 15% in the first quarter to 20 to 30% in the third one. For mechanical goods the gain for the eight months ran up to 50%, the higher level of industrial activity benefiting all lines. In rubber boot, slicker, and raincoat factories, operations were at a five-year peak.

Producers of rubber footwear operated on full schedules all Summer to catch up on their backlog of orders. Rubber heel manufacturers had one of the best years in the past decade, due to the record output of shoes. With the exception of the first three months, production of automobile tires (pneumatic casings) in each of the first eight months of 1936 was larger than in the corresponding one of 1935. The year's high of 5,610,000 units in June was the largest monthly output since June, 1933, at 6,100,000 units.

In the two months following, (July and August), production tapered off but held above 5,000,000 units, which brought the total for the first eight months of 1936 to 37,705,078, a rise of 12.6% from 1935, and the largest for the period since 1930. Despite this enlarged output, tire inventories at the close of July had shrunk to 7,746,000 units, the smallest recorded for any month since September, 1933, and compared with 8,196,000 at the close of 1935, the smallest since 1932.

All-Time Production Peak

Rising production in all divisions widened consumption of crude rubber in the United States this year to the largest proportions on record. An all-time peak was established in June, when consumption rose to 52,636 long tons, according to statistics compiled by the Rubber Manufacturers' Association. It also marked the third successive month and the fourth time in the history of the industry that the monthly total was in excess of 50,000 tons. The first time was in June, 1933, when the total was 50,743 tons.

Lifted to 377,754 long tons, crude rubber consumption in the United States for the first eight months of 1936 also set a new peak. The total was 14.8% more than the 329,106 tons used in the corresponding 1935 period, the previous high, and passed the 1933 comparative by 36.7% and that of 1929 by 8.0%. It was larger than the annual consumption for 1930, 1931, and 1932, which amounted to 375,980; 348,986, and 332,000, respectively.

General price structure in the rubber goods industry since May has been better maintained than for any period in the last six years. The result has been the elimination of any serious price-cutting, except in the footwear division. Since the early part of the second quarter, quotations on most items have been maintained 10 to 15% above those of 1935, with many mark-ups in prospect by January 1.

Fewer Bankruptcies Reported

Comparatively few concerns in the rubber industry have made recourse to Section 77-b of the New Bankruptcy Act since it became operative on June 7, 1934, the total amounting to 10. During the first ten months of 1936 only 3 cases were recorded, of which 1 was a tire manufacturer (India Tire). In the latter classification were included all 4 of the cases reported for 1935, and 1 of the 3 listed in 1934.

Since 1931, when the peak was established at 253, the annual reduction in the number of failures in the rubber industry has been constant. By the end of 1934 the total had dropped to 42 and was unchanged at that figure in 1935. While a further recession occurred in the first ten months of 1936, it was chiefly in the wholesalers' and retailers' group, which declined to 13 from 35 in 1935.

COMPLETE FORMATION OF WITCO CARBON CO.

Officers and directors of the recently incorporated Witco Carbon Company, a new entrant into the carbon black field, have been announced. The officers, and their respective titles, follow: Robert I. Wishnick, president; W. H. Ferguson, H. C. Fownes II, Joseph J. Tumpeer, vice-presidents; Ulysses S. Schwartz, secretary; G. F. Smith, H. B. Seligman, assistant secretaries; Robert T. Wilson, treasurer; and G. F. Smith, assistant treasurer. The officers, with the exception of H. B. Seligman, and with the addition of Mr. Clyde Alexander, form the directorate.

The new carbon black plant, which promises to be one of the largest carbon black units in the world, according to the new company, will be located at Sunray, Texas, while company headquarters will be maintained at 295 Madison Avenue, in New York City. An office will also be maintained at 832 Amarillo Building, Amarillo, Texas. The Sunray unit will cost in excess of one million dollars and when constructed is expected to have a daily capacity of 70,000,000 cubic feet of gas. Both the Continental Oil and Shamrock Oil and Gas companies are associated with Robert I. Wishnick in the new venture.

An advertising campaign planned by the Witco Carbon Company is being launched even before the plant is constructed, the thought behind the campaign being that potential customers will thus be kept advised of the company's progress and will be acquainted with its personnel, facilities, brand names, etc., prior to initial shipments. Hazard Advertising Corporation of New York is handling the unusual campaign.

May Reopen Fabric Plant

Although operation of Goodyear's tire fabric plant at New Bedford, Mass., is more costly than operation of the company's southern tire fabric units, the plant, which has been closed for several months, may soon be reopened, according to P. W. Litchfield, president, Goodyear Tire and Rubber Company, Akron. Increased tire production and lack of available tire fabric supply are believed to be the reasons the New Bedford unit may be reopened soon.

AKRON'S "BIG FOUR" ON HEAVY SCHEDULES

Heavy production schedules are being maintained this month by Akron's "Big Four"—Goodyear, Goodrich, Firestone and General. Goodyear has stepped-up tire production from four to five days a week; Goodrich is operating six days a week in nearly all departments; Firestone is varying from five to six days a week; while General has increased its number of employees substantially.

A statement from the Goodyear offices attributed the demand to the need for original equipment tires by the automobile manufacturers which is said to be far in excess of expectations. The statement also pointed out that "importance of the up-swing in the demand for original equipment tires and its resultant stimulus to manufacturing requirements at Goodyear is reflected by the records of the tire industry. In 1933 the total demand for original equipment tires was only 9,400,000 units. In 1936 the total demand was approximately 22,000,000 units. Conservative estimates of requirements in 1937 are placed at 24,000,000 units."

Firestone reported original equipment orders "ahead of last year" and revealed that approximately 10% more workers were employed in its factory than at the same time last year, the number now being over 10,000. Purchase of a factory at Memphis, Tennessee, for tire production will not result in any reduction in Akron production, according to Firestone officials.

Ban Rubber Articles

In keeping with the government's decree to conserve crude rubber supplies, a recent issue of the Official German Gazette published a list of 115 rubber products whose manufacture was prohibited. Such articles as "anti-snore muzzles," a small rubber gadget which passes under the chin and ties over the head for preventing snoring, flexible skimmers for taking the foam off the tops of beer glasses, form-fitting rubber poultices for training mustaches, and other articles made of rubber fall under the ban, the purpose of which is to make more natural rubber available for tire manufacture.

Buys Michelin Equipment

The complete surplus equipment of the Michelin Tire Company, Milltown, N. J., has been purchased by Edward Hutchens, Cudahy, Wisconsin. Mr. Hutchens, and a group of associates, deals extensively in the purchase and liquidation of practically all types of equipment and properties, giving his personal attention to power plants and rubber and plastic equipment. The Michelin purchase included mills, calenders, tubers, presses, horizontal vulcanizers, etc., all of which are currently being offered for re-sale.

Cloth Bound Copies of Bibliography Available

The "Bibliography of Rubber Literature—1935", recently published by THE RUBBER AGE, 250 West 57th Street, New York City, is now available in cloth bound copies as well as the regular paper bound edition. Cloth bound copies sell at $2.00 each, while the regular paper bound copies are $1.00 per copy.

Form Dutch Rubber Institute

Dedicated to the promotion of increased world consumption, a new rubber institute has been established in Amsterdam, Holland, under the auspices of the government. Operation of the Institute will rest in the hands of eight members of a special board, four of which have been named by the Governor-General of the Netherlands East Indies and four by the International Rubber Growers' Union of the N.E.I. Funds for maintenance will be secured from a small uniform duty assessed against net exports. The function of the Institute will be rubber research and propaganda. It is understood that similar institutes will be organized by other governments interested in rubber cultivation and supported in the same manner, an international rubber research board coordinating the work of each national institute being the ultimate aim.

Russia Reports Progress

The synthetic rubber industry of the U.S.S.R. (Russia) recently reported to the government that it has fulfilled the second five-year plan in three years and eleven months, the capacity of the industry in the last year having almost doubled that of the preceding year. The five-year plans call for a specific amount of production within a five-year period; therefore, it is possible to complete a five-year plan in less than the allotted time. According to report, Russia may soon discontinue importing natural rubber entirely, using synthetic rubber exclusively in its state factories, whereas at the beginning of the second five-year plan approximately 93% of the rubber consumed was imported.

Issue Anniversary Edition

Under an October, 1936, date line, *Gummi Zeitung*, the weekly German rubber journal published by the Union Deutsch Verlagsgesellschaft, Berlin, Germany, has issued its 50th Anniversary Number. Articles in the special number trace the progress of the German rubber industry along both manufacturing and merchandising lines, while research development through the years up to and including Buna, Germany's synthetic rubber, is also covered. Several of the articles are reproduced in English and French.

CONSUMPTION SHOWS 6.9% GAIN IN OCTOBER

Consumption of crude rubber by manufacturers in the United States for the month of October is estimated to be 49,509 long tons, which compares with 46,330 long tons for September. October consumption shows an increase of 6.9% over September and is 18% above October a year ago, according to statistics released by the Rubber Manufacturers Association. Consumption for October, 1935, was 41,969 (revised) long tons.

Imports of crude rubber for October are reported to be 40,920 long tons, a decrease of 15.4% under the September figure of 48,386 long tons, but is 19.1% over the 34,356 long tons imported in October, 1935.

Total domestic stocks of crude rubber on hand October 31, are estimated at 219,553 long tons, which compares with September 30 stocks of 228,477 long tons and 322,857 (revised) long tons on hand October 31, 1935.

Crude rubber afloat to U. S. ports as of October 31 is estimated to be 67,825 long tons as compared with 62,240 long tons afloat on September 30, and 49,913 long tons afloat on October 31 a year ago.

October reclaimed rubber consumption is estimated at 12,606 long tons; production, 14,737 long tons; and stocks on hand, October 31, 26,389 long tons.

TIRE SHIPMENTS FALL 22.9% UNDER AUGUST

Shipments of pneumatic casings during the month of September are estimated at 3,835,998 units, a decrease of 22.9% under August but 16% above shipments made in September, 1935, according to statistics released by the Rubber Manufacturers Association.

Production of pneumatic casings for September is estimated at 4,981,131 casings, a decrease of less than 1% under August but 31.5% above September, 1935.

Pneumatic casings in the hands of manufacturers, September 30, 1936, are estimated at 9,005,065 units, an increase of 15.6% over the stocks on hand August 31, and 8.7% above stocks on hand September 30, 1935.

The actual figures are as follows:

PNEUMATIC CASINGS

	Shipments	*Production*	*Inventory*
Sept., 1936	3,835,998	4,981,131	9,005,065
Aug., 1936	4,976,383	5,014,415	7,793,438
Sept., 1935	3,303,333	3,786,873	8,287,825
Sept., 1934	3,182,903	2,935,958	8,418,906

Studying Tire Chains

Headed by Dr. David F. Helm, an industrial fellowship to study the durablity of tire chains, has been founded at the Mellon Institute of Industrial Research, Pittsburgh, by the McKay Company, commercial chain manufacturers.

Names in the News

G. E. PERRY, formerly with F. R. Henderson and Company, has joined Herron and Meyer, Inc., at its Eastern office, 82 Beaver Street, New York City. He is well-known in the industry through his studies of crude rubber production and marketing.

NOAH VAN CLEEF, of Van Cleef Bros., Chicago, was scheduled to sail on December 8th on the *S.S. Monterey* for Australia and New Zealand where he will confer with the company's distributors.

FRANKLIN BRADSHAW, of Rittman, Ohio, recently returned from a four-year sojourn at the Firestone Liberian plantations, has left for Brazil where for the next two years he will supervise one of the Ford plantations.

ARTHUR C. GRIMLEY, connected with the Rubber Manufacturers Association for the past thirteen years, has joined U. S. Rubber Products, Inc., where, since September 15th, he has been Manager, Jobbing Sales, Shoe Products Division. His last position with the R.M.A. was as chairman of both the Heel and Sole Divisions.

J. C. HERBERT, engineer, Goodyear Tire and Rubber Company, Akron, discussed "Installation and Operation of High Pressure Boilers" before a meeting of the Canton (Ohio) Regional Society of Professional Engineers and Surveyors, held in Canton on December 1.

DAVID M. RAPPORT, president, Rapid Roller Company, Chicago, played host to members of the Lithographers' Club of Chicago on October 31, the occasion being the introduction of the company's rubber blanket department.

E. G. HOLT, assistant chief, Leather and Rubber Division, Department of Commerce, Washington, D. C., delivered an address on the expanding export market before members of the Export Club of Akron on November 13.

HENRY H. HURD has been appointed advertising manager of the Fisk Rubber Corporation, Chicopee Falls, Mass. HAMILTON SHERLOCK was named head of the Fisk sales department at the same time. Both appointments were announced by COL. CHARLES E. SPEAKS, new Fisk president.

HARRY E. BLYTHE, manager, retail stores division, Goodyear Tire and Rubber Company, discussed the decreasing volume of tire business on November 19 at a meeting of the Akron American Legion Luncheon Club. He laid the cause to increasing mileage and better tires.

SIMON COLLIER, formerly chief chemist at the Waukegan (Ill.) plant of the Johns-Manville Corporation, has been transferred to the headquarters staff of the company in New York City where he has been placed in charge of inspection and control of all factories. An active worker of the Chicago Rubber Group, Mr. COLLIER acted as chairman of the Group in 1933-34.

RALPH K. BISHOP has been named advertising and sales promotion manager of the B. F. Goodrich sundries division replacing M. N. TERRY who has been advanced to the post of sales manager of the same department. Mr. BISHOP was formerly engaged in market research.

W. C. METLIN, vice-president in charge of sales and production, Akron Belting Company, Akron, completed 50 years of continuous service with that company last month. He began as an apprentice and has held every job the factory provides.

G. E. BRUNNER has been appointed assistant general sales manager of the original equipment tire division of the B. F. Goodrich Company, Akron. He has been head of the national account sales department, including special account sales, with the title of Manager, Factory Account Sales, and joined Goodrich in 1929.

GEORGE H. HIMES has been named general sales manager of the Carlisle Tire and Rubber Company, Carlisle, Pennsylvania. He was formerly associated with the Fisk and India tire companies.

J. ARTHUR GIBSON, for several years purchasing agent of the Simplex Wire and Cable Company, Boston, and for the past two years assistant treasurer of that company, has been named vice-president in addition to his other duties.

N. H. KEELING has been appointed manager of retail sales promotion of the B. F. Goodrich Company, Akron. He was formerly Goodrich manager in the Buffalo, N. Y., district.

EDWARD D. LEVY, formerly president of the Fisk Rubber Corporation, was elected president of the Sloane-Blabon Corporation, New York City, carpet manufacturers, on November 20th.

HARVEY S. FIRESTONE, JR., delivered a radio address last month during which he stressed the fact that the new rubber tires for farm use represent "the most important development affecting the future of the rubber industry."

Joins Herron and Meyer

GEORGE J. KLEIN

George J. Klein has joined Herron and Meyer, Inc., sales agents for the General Atlas Carbon Company, makers of Gastex carbon black, where he will act as Technical Supervisor of the Gastex development work initiated by Dr. H. A. Winkelmann several years ago. Before joining the sales agents, Mr. Klein was head of the Raw Materials Inspection and Development Department of the B. F. Goodrich Company. Born in Vincennes, Indiana, in 1902, Mr. Klein received his early education in that city, and was graduated from Purdue University with a B.S. in chemical engineering in 1924, joining Goodrich in the same year. For eight years he served as a compounder of tires, tubes and mechanical goods, successively advancing to the position he held prior to joining Herron and Meyer. Although the scope of his work will carry him to all parts of the country, particularly to Texas where General Atlas maintains gas black plants and where a good deal of development work is carried on, Mr. Klein will continue to reside in Akron. Mr. Klein, incidentally, is a member of the American Chemical Society.

Litchfield Addresses Conference

P. W. Litchfield, president, Goodyear Tire and Rubber Company, Akron, addressed the New England Conference at the Hotel Statler in Boston on November 20th on "Current Trends in Industry." He staunchly defended the Social Security Act, and stated that unemployment insurance as well as old age pensions should be included in the cost of production "just as wages, interest, depreciation and such items as fire and theft insurance." He also urged closer cooperation with the Government on the part of industry, stating that "new forces are abroad in the land and older concepts are being re-examined."

NEW ENGLAND NEWS

A general upward revision of wage rates affecting 5,000 employees in the footwear plants of U. S. Rubber Products, Inc., Naugatuck, Conn., has been announced by Factory Manager Walter H. Norton. The increase, effective November 27, had been agreed upon between the Factory Council and the management, he said. The amount of the pay boost was not made known.

Following the annual shutdown last Summer, it was announced that hereafter every employee will receive an amount equal to 2% of his year's wages, payable during the shutdown period as a form of vacation pay. Announcement of the forthcoming wage increase came within a few months of the vacation pay statement.

Mr. Norton's statement read in part as follows: "Increased taxation, vacation pay, higher cost of raw materials and the proposed wage increase will build up a 1937 cost which will necessitate more sales and a reduction in waste. The result of the economy drive in the Spring of 1933 which enabled us to avoid a wage cut must be duplicated in 1937, if our company is to carry on the profitable operations essential in continuance of the business.

"We must strive for higher standards, utilizing labor, materials and floor space more efficiently to justify higher wages from a company that: (1) Made no profits from 1928 to 1935. (2) Paid no dividends since 1927. (3) Has maintained the highest annual wage scale in the rubber footwear industry, a wage scale that did not drop as rapidly as the cost of living from 1929 to 1932, and which rose much faster thereafter.

"Some industries making wage increases can raise prices. In the rubber footwear industry, however, due to conditions in the domestic market and the threat of foreign importations, the trend of prices is downward."

A similar announcement was made by Charles T. Manville, factory manager of the Shoe Hardware Company, in nearby Waterbury, another United States Rubber subsidiary. About 450 employees are affected in the Waterbury plant, which produces buckles, eyelets and other accessories.

Other New England rubber concerns which have granted pay increases or are preparing to do so include Fisk Rubber Corp., Chicopee Falls, Mass., 11%; H. O. Canfield Co., Bridgeport, Conn., 5%; E. I. du Pont de Nemours & Co., Fairfield, Conn., 8%; and Goodyear Rubber Co., Middletown, Conn. The Canfield wage boost, affecting 400 employees, will be accompanied by a Christmas bonus amounting to one week's pay, while 350 hands will receive the additional pay at the du Pont plant with a weekly payroll increase of about $2,200. The Goodyear company posted notices that wage schedules are being studied with a view to upward revision, but the amount of increase and the effective date were not disclosed.

Stamford Rubber Supply Company, Shippan Lane, Stamford, Conn., has awarded contracts for erection of an addition, to be 60 x 60 feet, three stories high, of reinforced concrete.

Alling Rubber Company, Hartford, operating a chain or rubber goods stores, has changed its capital structure by a series of financial moves involving purchase of its own shares, reduction of capital stock and issuance of new shares.

Leasing of the former Westinghouse plant in Middletown, Conn., by the Goodyear Rubber Company of the same city, announced last month, has enabled the rubber raincoat concern to expand production in its old plant. A section of the Westinghouse property is being used for storage of raw material and finished goods. It is possible also that the offices will be moved from the Church street plant to the new building and the space they occupied in the old structure turned over to manufacturing departments. The main building involved in the lease is three and four stories high, 100 x 208 feet, containing 72,000 square feet of floor space, part of which is now occupied by other industrial tenants.

Jenkins Bros., Bridgeport, Conn., will add from 500 to 1,000 employees when production is begun on the new capless rubber valve invented by Frank H. Watson of Jonesboro, Ark., which is expected to prove revolutionary in the tire field. The valve is said to ensure slow deflation in case of a blowout. Since the announcement that Jenkins Bros. would manufacture the new valve, the company's stock has increased in value from 18½ to 35½.

Bristol Company, Waterbury, Conn., has announced the addition of four graduate engineers to its field service organization, whose primary duties will be to inspect periodically and make minor repairs for customers who have subscribed to the periodic inspection service furnished by the company. The new engineers and their territorial headquarters offices are: E. H. Hart, graduate of Geneva College, Boston; J. N. Swarr, Purdue graduate, New York; K. J. Platt, B. S. and M. S. in chemical engineering, Queen's University, Ontario, Philadelphia; and B. A. Barnes, Purdue, St. Louis.

Theft of aluminum molds from the Seamless Rubber Company, New Haven, Conn., presumably for sale as junk metal, is believed to have been stopped through action of New Haven police in arresting three New Haven youths who admitted taking $250 worth of aluminum from the company's yard.

Destruction by fire on November 27 of most of the old L. E. Candee Rubber Company factory on East Street, New Haven, Conn., marked the virtual end of a rubber industry landmark. Candee discontinued operations a number of years ago and lately the big plant has been maintained as a multiple-occupancy mercantile and manufacturing building, owned by Frank Kenna. Among the individual tenant factories wiped out by the blaze was that of the Elm City Rubber Company, which produces miscellaneous rubber goods. Radio descriptions on the day following the fire caused rumors that the Canfield Rubber Company plant in Bridgeport had burned down, the mistake being due to similarity in names. Loss involved in the New Haven blaze was estimated at about $400,000.

Monsanto Plans Building

The Monsanto Chemical Company is planning to erect a new factory building in Akron at the corner of Goodrich and South High streets. The building will be one story in height, with provision for a second story if required in the future, and will measure 35 x 90 feet in size. It is expected to cost approximately $100,000. Monsanto, including the Rubber Service Laboratories Division, maintains Akron offices in the Second National Building and operates a factory at 367 South Main Street.

INTERNATIONAL PULP CO., *41 Park Row, New York, N.Y.*

SOLE PRODUCERS OF PURE ASBESTINE SPECIALLY PREPARED FOR USE IN RUBBER

Covered and Protected by Letters Patent Registered at U. S. Patent Office, Washington, D. C.

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Financial News

NEW GOODYEAR PLAN OFFICIALLY APPROVED

The Board of Directors of the Goodyear Tire and Rubber Company, meeting in Akron on November 23, officially approved the plan for rearrangement of the company's capitalization which was approved by stockholders at a special meeting two days previously. The plan provides for the creation of new $5 convertible preferred stock which will be senior as to both assets and dividends over the outstanding $7 preferred stock.

Goodyear's new senior stock will be convertible into common shares until October 1, 1946, at an initial rate of three shares of common stock for one share of preferred. Holders of the outstanding stock are offered one share of the new $5 convertible stock (preferred) and one-third of a share of common stock for each preferred share exchanged. The company will accept for exchange all shares of outstanding preferred stock surrendered to the transfer agents, the Guaranty Trust Company of New York and the National City Bank of Cleveland, prior to the close of business on December 18th, 1936. The new stock is dated February 23, 1936, and carries accrued dividends since that date.

On November 25th, two days after ratifying the new stock plan, Goodyear directors declared a dividend of $4.25 per share on the new $5 convertible stock, payable December 23 to holders of record December 18th. This dividend represents payment in full of all dividends accruing during 1936 on the new stock since February 23, its issue date, and is in addition to four quarterly dividends of $1 each per share which had previously been paid on the outstanding old first preferred stock this year. The total dividends will amount to approximately $3,250,000, exclusive of the $3,000,000 already paid out.

NEW GOODRICH LOAN OFFERED TO PUBLIC

A new issue of $27,000,000 of first-mortgage 4¼% bonds, due in 1956, of the B. F. Goodrich Company, the first step in the refinancing program recently approved by the directors and stockholders, was offered to the public on November 23 by Goldman Sachs and Company, New York brokerage concern. The bonds are priced at 101 and accrued interest. Of the net proceeds of this financing, $17,571,005 will be used for redemption at 107 on February 1, 1937, of all Goodrich outstanding 25-year first mortgage 6½% bonds, due in 1956, in accordance with the refinancing program.

Annual interest charges on the new offering will amount to $1,147,500, while total annual interest obligation on all funded indebtedness of the company and its subsidiaries, including Hood Rubber, to be outstanding upon the completion of the financing scheme will amount to approximately $2,356,800. The new bonds will be redeemable, in whole or in part, at any time on not less than thirty days' notice, other than for the sinking fund, at 105, until December 1, 1939, and thereafter at successively reduced prices. The sinking fund is expected to retire not less than $675,000 of the bonds yearly, starting on December 1, 1937.

Goodrich directors last month declared a quarterly dividend of $1.25 per share on the $5 cumulative preferred stock, the second $1.25 dividend to be declared since the stockholders approved the recapitalization plan on September 9th, 1936. The second dividend was payable to holders of record on December 10 and is to be paid at the end of the fourth quarter of the year.

FIRESTONE PROFITS INCREASE SHARPLY

For the fiscal year ended October 31, 1936, the Firestone Tire and Rubber Company, Akron, and subsidiaries, report a net profit of $9,142,654, after interest, depreciation, Federal income taxes, and other charges, which compares with a reported profit of $5,649,146 in the previous fiscal year. After dividends on the Series A 6% cumulative preferred stock, the 1936 net profit is equivalent to $3.28 each on 1,932,497 shares of $10-par common stock, which compares with $1.53 each on 1,866,007 common shares in the corresponding previous period.

According to the balance sheet as of October 31, Firestone's current assets amounted to $75,693,520, of which $11,279,479 was in cash; current liabilities were shown at $24,048,912. The balance sheet at the end of the previous fiscal year showed current assets of $66,743,787, of which $11,613,287 was in cash, with current liabilities listed at $19,610,234. Inventories increased from $35,995,720 to $43,762,364.

In a statement to stockholders accompanying the report, Harvey S. Firestone, Sr., chairman of the board, advised that sales in the period reported on increased to $135,701,916, a gain of 14%. He also made mention of the new factory constructed by Firestone at Port Elizabeth, Union of South Africa, and stated that the plant now has "a daily capacity of 1,000 tires and tubes." The financial statement reveals a total of $6,315,367 charged off to depreciation of plant and equipment.

EXPECT GENERAL TIRE TO SHOW BIG PROFIT

According to well-informed sources, the General Tire and Rubber Company, Akron, which reported a net loss of $115,756 in 1935, will show a net profit of "close to a million dollars" for the current year. General is said to have enjoyed its best year since 1929. The expected profit is based on estimates after payment of 12 months' dividend requirements on the company's 6% preferred stock and would equal approximately $2 per share on nearly 450,000 common shares outstanding.

Net sales for 1936 have been running 8 to 10% greater than in 1935, during which total net sales amounted to $15,500,000. Because General's fiscal year ends on November 30th, the company will not be liable for a surtax on its undistributed profits and therefore is expected to pay off accumulations on the preferred stock amounting to approximately $210,000. This payment will probably be made early in 1937.

Because General recently split its common stock 5 to 1 by reducing the par value from $25 to $5 per share, giving stockholders five shares for each old share held, the consolidated balance sheet for the fiscal year will undoubtedly show many changes. Bank loans are expected to be higher than in the last annual report, but working capital, which amounted to $5,571,472 last year, is also expected to be larger.

Columbian Carbon Profit

For the nine months ended September 30, the Columbian Carbon Company, New York City, in a preliminary report, shows net earnings of $2,654,104 after depreciation, depletion, Federal income taxes and other charges, but before provision for the Federal surtax on undistributed profits. Earnings are equivalent to $4.94 a share on 537,411 shares outstanding, and compares with a net profit of $2,127,787, or $3.96 a share on 537,581 shares, in the corresponding period of the previous year.

Thermoid Reports Earnings

For the quarter ended September 30, 1936, the Thermoid Company, Trenton, N. J., and domestic subsidiaries, reports net profit of $55,423, equal after quarterly dividend requirements on 30,417 shares of 7% preferred stock on which there is an accumulation of unpaid dividends, to 1 cent each on 255,971 shares of $1-par common stock. For the quarter ended June 30, net profit amounted to $91,517.

Firestone Raises Dividend

Directors of the Firestone Tire and Rubber Company, Akron, authorized an increase in the quarterly dividend on common stock on November 5th, raising the payment from 30 to 50 cents per share on approximately 1,800,000 common shares.

Gain for N. J. Zinc

A net income of $3,593,585, after Federal taxes, depreciation, depletion and other charges, for the first nine months of 1936, is reported by the New Jersey Zinc Company, New York City. No mention of the Federal surtax on undistributed profits was contained in the report. The profit is equal to $1.83 each on 1,963,264 shares of $25-par capital stock, and compares with $3,342,216, or $1.70 a share, in the first nine months of 1935. Net income for the third quarter of the current year, after deductions, amounted to $1,253,813, or 64 cents a share.

Raybestos Earns $2.30

For the nine months ended September 30, 1936, Raybestos-Manhattan, Inc., Passaic, N. J., earned $1,461,525, or $2.30 per share, as compared with net income of $1,108,902, or $1.75 per share, in the corresponding period of the previous year. No provision has been made for the Federal surtax on undistributed profits. The balance sheet as of September 30 shows total current assets of $9,433,979 against total current liabilities of $1,089,414, a ratio of approximately 9 to 1.

Seeks Representative Lines

Henry Woog, 28 Rue St. Georges, Paris, France, now representing a manufacturer of carbon black in that country, is seeking to add several allied items saleable to French rubber manufacturers, including compounding materials and rubber equipment and machinery. According to Mr. Woog, he has been contacting these manufacturers for the past twenty-five years and believes that he can secure respectable sales volume in France for a few American manufacturers.

Bicycle Tire Production

More than 1,000,000 bicycle tires were built by U. S. Rubber Products, Inc., in the first eight months of the current year, according to a report from that company, the first year since the Gay Nineties (when the bicycle reached its peak of popularity) that the company has touched the one million mark. Since its inception, U. S. Rubber has produced 65,000,000 bicycle tires. Known as the world's largest producer, U. S. Rubber turns out all of its bicycle tires at its Indianapolis (Ind.) plant.

Exhibit Tag Instruments

The C. J. Tagliabue Manufacturing Company, Brooklyn, N. Y., exhibited its complete line of recording and controlling instruments for temperature, pressure, level, flow, etc., at the Twelfth National Exposition of Power and Mechanical Engineering, held in Grand Central Palace, New York City, the week of November 30-December 5. The exhibit was under the supervision of V. Wichum, chief engineer.

Golden State Washers

The Radiator Specialty Company, Charlotte, North Carolina, are now packaging their Golden State rubber washers in three convenient forms for

the trade. These washers, said to be flexible enough to provide easy shutting-off yet rigid enough to withstand wear and prevent undue scoring, are now available in lock-top cans containing 100 washers, in special steel kits containing 200 washers in seven of the more popular sizes, and mounted on display boards.

Issue New House Organ

The Baldwin-Southwark Corporation, Philadelphia, Penna., has started publication of a house organ to be known as "Baldwin-Southwark." The first issue commemorates the one hundredth anniversary of the company, which was founded in 1836 by Samuel V. Merrick, and the articles treat with the development of machinery produced by the company and its affiliates. The new house organ is to be issued quarterly.

TRENTON NEWS

United States Rubber Products, Inc., maintained a general display of retail rubber products for three days last month in the Hotel Hildebrecht, Trenton. Howard Livesey, of Philadelphia, and John Vaughn, of Trenton, were in charge of the exhibit which included wearing apparel and footwear.

Several Trenton rubber manufacturers displayed their wares at the annual convention of the Atlantic Deeper Waterways Association recently held in Trenton.

A luncheon-meeting sponsored by the Firestone Tire and Rubber Company, Akron, was held at the Hotel Hildebrecht, in Trenton, on October 28th. John M. Bushey, Firestone's Philadelphia representative, presided.

Three thousand employees of the Manhattan Rubber Manufacturing Division, Raybestos-Manhattan, Inc., will receive bonuses amounting to a week's salary for those employed prior to the beginning of the current year and a half-week's salary for those employed sometime during the first six months of the year, in the near future. Raybestos-Manhattan has also declared a regular dividend of 37½ cents and a special dividend of 25 cents a share on its outstanding common stock.

Japan Almost Self-Sufficient

Growth of the Japanese rubber manufacturing industry in the past six years has been so rapid that the country is almost self-sufficient where rubber products are concerned, only highly technical rubber goods still being imported in any appreciable volume, according to American Assistant Trade Commissioner Carl H. Boehringer, stationed at Tokyo. The latest product in the self-sufficiency list is rubber packings for machinery, only quality packings still being imported. Mr. Boehringer also reports that American rubber manufacturers can look forward to Japanese competition in export markets on rubber products heretofore left almost solely to American enterprise.

Develop Endless Traction Belt

A solid rubber endless traction belt for track-laying vehicles, developed by engineers of the B. F. Goodrich Company, Akron, is expected to give new impetus to the tractor manufacturing industry which had a production volume of approximately $150,000,000 last year, representing 161,131 tractor units of which 18,744 were of the track-laying type. Development of the new rubber track is said to make possible a more versatile heavy-duty tractor capable of operation over soft terrain and mobility on highways without damage to the pavement.

Form Canadian Subsidiary

With H. L. Blachford as president, Binney and Smith, Ltd., has been formed in Canada, with headquarters at 977 Aqueduct Street, Montreal. The new organization will handle the complete Binney and Smith line of carbon blacks, bone blacks, synthetic iron oxides, stearic acid and mineral rubber in Canada, with the New York headquarters functioning on all technical matters. Mr. Blachford, the president of the Canadian subsidiary, has represented Binney and Smith for the past 15 years as Canadian agent.

Goodrich Awards Plaque

Culminating its search throughout the country for the originator of the center traffic line idea, the B. F. Goodrich Company presented Edward N. Hines, the discovered originator, with a plaque commemorating his contribution. The award was made at the annual banquet of the American Automobile Association, recently held in Detroit.

£1,131,000 for India Tyre

In taking over the India Tyre and Rubber Company, Ltd., Inchinnan, Scotland, the Dunlop Rubber Company, Ltd., paid the sum of £1,131,000 (pounds sterling) and not $1,131,000 as previously reported in these columns. In American money, at the current rate of exchange, the purchase price amounted to approximately $5,655,000.

Akron Briefs

Following reports of financial and statistical agencies on improved conditions in the rubber industry generally, since last Spring, smaller companies in the Akron area indicate a share in the prosperity wave that began last Spring and promises to follow through into the new year. The Mohawk Rubber Company reports a steady increase in business since last March. The factory is working at capacity six days a week with every prospect of a good year this year and a prosperous year in 1937. The Seiberling Latex Products Company will show a substantial increase in business this year over last, with 1937 promising to keep them in step with the companies whose greater volume is tires. This company manufactures drug sundries, toy balls, dolls and specialty toy goods.

Early in February, according to present plans, the Akron Truss Company will move into its new factory and office building in Portage Trail, in Cuyahoga Falls. The new building of red brick and steel is now under construction, and will provide about 10,000 feet of floor space. New and modern equipment, engineered for most economical and efficient operation, will be installed, according to Mr. H. B. Houghton, Jr. However, rubber material used in the manufacture of trusses will not be made in the new plant.

Sales for 1936 will show an appreciable increase over the previous year, said Mr. Houghton, in export, wholesale and special lines. Prospects for continued sales increase for next year are very promising. The present location of the Akron Truss Company is in South High Street, Akron.

Another popular comic strip character has been added to rubber ball toys. According to officials of the Seiberling Latex Products Company, they have been licensed to use Popeye the Sailor on sponge and inflated rubber balls. With the appeal of this popular character in their line and another new product to be announced the first of the year, officials of this company are optimistic over prospects of continued prosperity during the coming year.

C. W. Christensen, of the Monsanto Chemical Company, and secretary of the Rubber Division, A.C.S., left on the first of this month for a flying trip to Mexico. Flying is literal in this connection since Mr. Christensen rode a plane down and expects to return that way—a means of transportation that will allow him several more days for business transactions. He expects to return to Akron a few days before Christmas.

H. T. Youngren, chief engineer of the Oldsmobile division of General Motors, is to be the guest speaker at the January 15th meeting of the Akron Rubber Group, according to Dr. A. E. Warner of C. P. Hall & Company, secretary of the Group. Tentative plans are to hold the meeting at the Akron City Club, Dr. Warner said.

New Sponge Rubber Company

Operations of the Sponge Rubber Company of America, a new corporation controlled by the Dayton Rubber Manufacturing Company, will begin shortly at Dayton, Ohio, in a new building being erected at the Dayton Rubber factory. As the name indicates, the new company will manufacture sponge rubber products exclusively, particularly for use in upholstery according to reports from Dayton. The Sponge Rubber Company is owned jointly by Dayton Rubber and the Liquid Carbonic Corporation. Incorporation of the new company provides for the issuance of 1,000 shares of no-par value stock, with initial capitalization of $35,000.

Muehlstein Heads Division

Organizing the rubber industry of New York City to present the appeal of New York's voluntary hospitals, Herman Muehlstein, of H. Muehlstein & Company, Inc., has accepted the chairmanship of the Rubber Division of the United Hospital Campaign Committee.

New Rubber Tile Line

G. C. Denebrink, assistant general manager, Building Materials Division, Armstrong Cork Company, Lancaster, Pennsylvania, announced a complete new line of rubber tile at the recent Tile Contractors' Convention. The new line, a result of Armstrong's recent purchase of the Stedman Rubber Flooring Company, supersedes the old Stedman and Armstrong lines, and includes forty separate colors. According to Mr. Denebrink, old Armstrong and Stedman colors will be stocked until February 1, 1937, to cover current commitments, after which an extra charge will be made for colors not in the new line.

Casey Recuperating

Robert E. Casey, of the Naugatuck Chemical Division, U. S. Rubber Products, Inc., is reported well on the way to recovery from the effects of an appendectomy performed recently at the French Hospital, in New York City. Mr. Casey is currently reported in Bermuda, but is expected in New York around the middle of December.

RUBBER EXPORTS SHOW GAIN IN SEPTEMBER

Exports of rubber manufactures from the United States in the month of September amounted to $2,259,077, according to the Bureau of Foreign and Domestic Commerce, which was 29.3% above the same month of the previous year and 37.3% above the figure of $1,645,253 in August of the current year. The increase is particularly surprising in view of the fact that the usual seasonal trend was reversed sharply.

In the first nine months of 1936 United States exports of rubber products amounted in value to $17,531,006, a gain of 7.1% over the $16,369,676 exported in the same period of 1935. Gains in the first nine months of 1936 as compared with the same period of the preceding year were recorded in tires, tubes and tire sundry materials, rubber belting, hose and packing, sundries, specialties and toys, rubberized fabrics and hard rubber goods, while losses were experienced by rubber footwear and reclaimed and scrap rubber.

BRAZILIAN EXPORTS SHOW BIG INCREASE

Exports of crude rubber from Brazil in the first nine months of the current year are reported to have been 9,625 long tons, or approximately 25% more than the 7,724 long tons exported during the corresponding period of 1935, and 60% more than the 6,011 long tons exported in the first nine months of 1934.

Although Brazil, the original home of the *Hevea brasiliensis*, supplies only about 1.5% of the total annual rubber supply, greater exports this year indicate that higher prices in crude rubber markets are having an effect upon the production of native crops. If the rate of exports is continued during the last three months of the year, Brazil will have contributed over 12,800 long tons of rubber to world supply in 1936.

Union Fuse Puller

A special tool for pulling and inserting 30 and 60 ampere fuses has been developed by the Union Insulating Company, Parkersburg, West Virginia. The tool consists of spring steel wires molded into rubber, the rubber acting as both a covering and a handle, fully insulating against shock. The new tool, which is 6½ inches long and 1⅛ inch in diameter, is constructed so that one end handles 30 ampere and the other 60 ampere fuses.

Obituaries

Frank G. Morley

Frank G. Morley, vice-president and general manager, Canadian Goodrich Company, Ltd., Kitchener, Ontario, Canada, died at his Canadian home on No-

vember 26 from a heart attack. He was 44 years old. A native of La Crosse, Wisconsin, Mr. Morley spent his youth at Madison, Wisconsin, and was graduated from the Madison High School. He attended the University of Wisconsin and received his degree in 1915. Shortly after being graduated Mr. Morley joined Goodrich at Akron as a member of the accounting department and later became a traveling auditor for the company. In 1919 he left Goodrich to go into business with his father-in-law in Iowa, but returned in 1922 in the credit division. One year later he was transferred to the credit department of Canadian Goodrich remaining with that branch until his death. In 1925 Mr. Morley was appointed General Credit Manager of the new Canadian Goodrich Company, Ltd., formed after Goodrich absorbed the Ames Holden Tire and Rubber Company, and the following year was named secretary-treasurer of the new concern. In June of last year he was elected vice-president and general manager of Canadian Goodrich, succeeding E. S. Sargeant who was granted an extended leave of absence. In all, Mr. Morley was associated with Goodrich for 20 years. He leaves a widow, a son and a daughter.

William S. Rowland

William S. Rowland, president, the Stanley Chemical Company, East Berlin, Connecticut, and technical director of the Stanley Works, of New Britain, Conn., died suddenly on November 12 at the age of 55 from a heart attack. Mr. Rowland joined Arthur D. Little, Inc., as a chemist, immediately after being graduated from college, and after concluding an assignment with the Stanley Works he joined that company as a chemical engineer, later becoming technical director. His development of several processes relating to lacquers, japans, enamels, etc., ultimately led to the organization of an affiliate manufacturing organization—the Stanley Chemical Company—under his personal direction. Starting in a small plant in Forestville, Conn., in 1911, the new company moved to New Britain in a few years and later established a branch at East Berlin where, by 1923, all operations were concentrated including the manufacture of special lacquers for the rubber industry. A member of the Chemists Club in New York City, Mr. Rowland was also a director in several Connecticut companies. He leaves a widow, two sons and two daughters.

Edward S. Pierce

Edward S. Pierce, prominently identified with the creation of the rubber heel industry, and for the past twenty-three years advertising manager of the Clicquot Club Company, died at his home in Medfield, Mass., on November 29th at the age of 64. Death was attributed to heart disease. Born in Augusta, Maine, Mr. Pierce received his education in Springfield, Mass., and at an early age entered the employ of J. Walter Thompson, an advertising agency, where in a few years he became New England manager. In that capacity he was called on to devise marketing plans for the rubber heel which the O'Sullivan Rubber Company was about to introduce, and to his ingenuity is credited the now-famous O'Sullivan wing trade-mark. Soon after Mr. Pierce left the agency to join Clicquot Club, O'Sullivan was sold to other interests. In his new connection he created the famous Eskimo Boy trade-mark and is believed to have personally written the unique theme-song emulating the bells on an Eskimo sled which featured the radio broadcasts sponsored by Clicquot Club for a number of years. Funeral services were held on December 1, followed by cremation at the Forest Hills Cemetery in Millis, Mass. His widow survives.

Thomas J. McKeon

Thomas J. McKeon, 50, vice-president of the Auburn Rubber Company, Auburn, Indiana, died November 27 at the home of his parents in West Warren, Mass. He had been prominent in the rubber industry for many years, and at one time was connected with companies in North Brookfield and Chelsea, Mass. His wife, a son, three brothers and a sister survive. Funeral services and interment took place in Warren, Mass.

Mrs. Dorothy Herbert

Mrs. Dorothy Herbert, wife of Joseph C. Herbert, vice-president and general manager of the Pacific division of the B. F. Goodrich Company, died at the age of 39 in Los Angeles on November 14. Funeral services were held on November 17, with interment in Los Angeles. Besides her husband, she leaves two sons and two daughters.

Dramatize Story of Rubber

The long struggle of Charles Goodyear to discover a method of making rubber commercially practical and his pioneering research which led to the discovery of vulcanization were the subject of a graphic and interesting broadcast over the coast-to-coast network of the Columbia Broadcasting System on November 18th. Presented as an episode in the "Cavalcade of America", sponsored weekly by E. I. du Pont de Nemours and Company, Inc., the broadcast traced the efforts of Charles Goodyear from his initial interest in rubber in 1834 until his discovery of vulcanization in 1839, dramatizing events of his life between those years. At the conclusion of the broadcast a motion picture film on "The Wonder World of Chemistry" was shown to a specially invited audience.

Mechanical Rubber Activities

Production of mechanical rubber products has been steadily increasing for the past several months. Many of the regular manufacturers have installed new and more modern equipment, while several companies have announced their entrance in the field. Among the latter are included Golf Ball, Inc., Chicago, which is installing a mechanical goods department; G. R. Bethel, 6647 S. Keating Avenue, Chicago, a new concern; and the Filer City Fibre Company, Filer City, Michgan, which is putting in a rubber division to include mechanical goods production, the new division to have a separate, but as yet unselected, name.

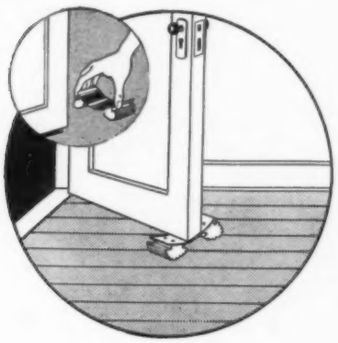
Making Tires in Poland

The firm of Anglo-Polish Rubber Manufacturers, Lodz, Poland, advises that it has been manufacturing automobile tires in that country for several years and "is likely to continue doing so." Previous reports, appearing in this journal and elswhere, stated that the Stomil, S. A., Poznan, Poland, with which company the General Tire and Rubber Company recently contracted to supervise its tire production, was the only manufacturer of automobile tires in Poland.

New Rubber Goods

Jay-Way Door Holder

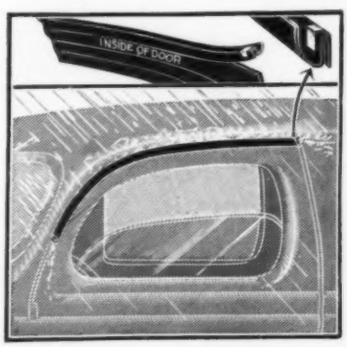
The Jay-Way Door Holder, described as a household and office necessity, has been perfected and patented by W. Jennings Butts, 1 East 42nd Street, New



York City. This new holder measures 2 inches wide by 5 inches long, and is made of nickel-plated spring steel to the underside of which is attached two ribbed rubber pads. The pads grip the floor firmly without scratching them, only slight pressure on the steel plate being necessary to slide the device under the door. Use of this new item makes possible any desired degree of ventilation since once in place the door cannot swing in either direction.

Rubber Rain Gutter

An improved model of the rubber rain gutter has been developed by the Champion Anti-Rattler Company, Inc., St. Louis, Missouri. This device, which is applicable to all types of popular cars, consists of a close-fitting rubber drip moulding that stops roof drainage from dripping into the car by directing the rain stream along the top outer edge of the windows. It may be quickly in-



stalled without the use of tools, blends gracefully with the contour of the car, is designed for long life, and can be sprayed or painted to match the color of the car.

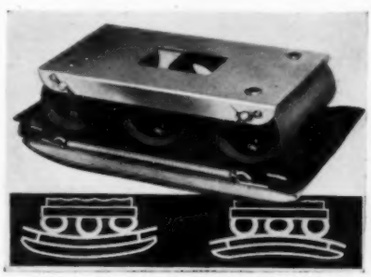
Manhattan Top Press Roll

Made of a specially prepared rubber compound, said to eliminate the tendency of rolls to adhere to the sheet, the Manhattan Rubber Manufacturing Division, Raybestos-Manhattan, Inc., Passaic, N. J., has introduced the Rub-Roc Top Press Roll for use in the paper-making industry. Recommended for top press and smoothing press service, the repellant feature of the new rubber roll causes sheets to be instantly released.

Other advantages claimed include: felt wear is decreased and crushing of the sheet avoided; no "pick-up" or cracking in service; and distinctive appearance, mottled red and black surface.

Sterling Speed-Bloc Sander

A new type of electric sanding and rubbing machine of reciprocating action has been developed by the Sterling Prod-



ucts Company, Detroit, Michigan. In addition to other features, the Sterling Speed-Bloc Sander incorporates the principle of "floating" which provides flexibility for sanding and rubbing of curves which heretofore necessitated hand operation. In this "floating" feature, flexible rollers of special composition rubber and fabric are attached "floatingly" by pins to the sander bloc. The bloc, too, is made of a special rubber composition which makes possible the adaption of the abrasive surface to varying contours. The accompanying illustration shows by diagram the principle of "floating."

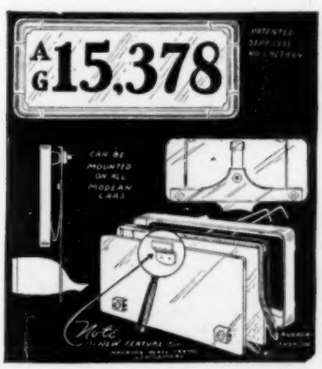
Mohawk Snomud Chief

A super-traction tire which will pull through mud, snow, sand and muck better than chains, according to the manufacturer, has been introduced by

the Mohawk Rubber Company, Akron, under the trade name of the Mohawk Snomud Chief. Made in the "cleated" type, it has been designed to relieve carcass strain, gives super-traction forward, backward and sideways, and will give the maximum of service and the minimum of vibration on hard paved roads, according to Mohawk, in addition to good operation under other road conditions.

Rubber-Cushioned Plate Frames

New plate frames, made of solid brass with double chromium plate, the glass front of which is protected on all sides and corners by channel rubber, have been developed by the Rayline Manufacturing



Company, Boston, Mass., in answer to recently enacted laws, passed by many states, which require automobile number plates be kept clean. A special locking feature prevents the frames from coming apart or from rattling.

MARKETS

RUBBER—COTTON AND FABRICS—CHEMICALS

NEW YORK, DECEMBER 8, 1936

Crude Rubber

FOR the first time since 1929 spot rubber passed the 19-cent mark on the Exchange on December 5, culminating a series of price advances attributed to a wave of factory purchasing. High for the period since our last report was 19.31 on December 5th and 8th; low was a 17.60 quotation on November 12. Futures in all world markets have also advanced into new highs for the season, stimulated largely by shipments of crude rubber from the United Kingdom to several European countries, including Italy, as well as to Russia, despite statements emanating from the latter country that its synthetic rubber production is sufficient to cover the country's requirements. It is believed that the gathering war clouds over Europe are behind these purchases which have made deep inroads in available London stocks. Based on pressure from consuming countries, the International Rubber Regulation Committee, at its next meeting on December 15th, is expected to increase the amount of permissible exports from signatory countries so as to permit larger available world stocks sufficient for more than a six-month period. Quotations in the outside market, Exchange, London and Singapore, follow:

As of December 8

Plantations—

Ribbed Smoked Sheets—			
No. 1 Spot	—	@	.19 1/16
January-March	—	@	.19 3/16
April-June	—	@	.19 3/16
No. 2	—	@	.19 1/16
No. 3	—	@	.19 1/16
No. 4	—	@	.19 1/16
Thin Latex Crepe	—	@	.20 1/16
Thick Latex Crepe	—	@	.20 1/16
Brown Crepe, No. 1	—	@	.19 1/16
Brown Crepe, No. 2	—	@	.19 1/16
Amber Crepe, No. 2	—	@	.19 1/16
Amber Crepe, No. 3	—	@	.19 1/16
Amber Crepe, No. 4	—	@	.19 1/16
Brown Crepe, Rolled	—	@	.18 7/16

Latex—

Liquid Latex, per gal.	.68	@	.70

Paras—

Up-River, fine	—	@	.23 1/4
Acre Bolivian, fine	—	@	.23 1/2

Balata—

Block, Ciudad	—	@	.30

LONDON MARKET

Standard Smoked Sheets—Buyers—December 8

January-March	—	@	9 1/4d
April-June	—	@	9 1/4d

SINGAPORE MARKET

Standard Smoked Sheets—Sellers—December 10

January-March	—	@	9 5/32d
April-June	—	@	9 7/16d

Reclaimed Rubber

Reclaimers report continued activity on practically all grades and predict an inevitable price rise if the demand continues. With crude rubber prices now over the 19-cent mark and continuing upward reclaimers are optimistic. Reports that European nations are making deep inroads on available crude rubber stocks are also expected to benefit the reclaim market. There has been no change in prices since our last report.

High Tensile

Super-reclaim, black	lb.	.09 1/4	@	.09 1/2
High Tensile Red	lb.	.08	@	.08 1/4

Shoe

Unwashed	lb.	.06 1/2	@	.06 3/4
Washed	lb.	.08	@	.09

Tube

No. 1 (Floating)	lb.	.16	@	.16 1/4
No. 2 (Compounded)	lb.	.07 3/4	@	.08
Red tube	lb.	.07 3/4	@	.08

Tires

Black	lb.	.05	@	.05 1/4
Black, selected tires	lb.	.05 3/8	@	.05 5/8
Dark Gray	lb.	.06 3/4	@	.07
White	lb.	.11	@	.11 1/4
Truck, Heavy Gravity	lb.	.05 1/2	@	.06
Truck, Light Gravity	lb.	.06	@	.06 1/4

Miscellaneous

Mechanical blends	lb.	.03 3/4	@	.04 1/2

Scrap Rubber

(Delivered Akron Mills)

Dealers report continued heavy demand with indications pointing to a long pull. Prices have advanced on five different grades since our last report. Stocks are tightening up, a situation generally encountered during the Winter months. Rising crude rubber prices contribute to current optimism. Current quotations follow:

(Prices to Consumers)

Auto tire peelings	ton	19.00	@	20.00
Mixed auto	ton	12.50	@	15.00
Beadless tires	ton	17.50	@	20.00
Clean solid truck tires	ton	28.00	@	30.00
Boots and shoes	ton	17.50	@	20.00
Arctics, untrimmed	ton	12.50	@	15.00
Inner tubes, No. 1	lb.	.10	@	.12
Inner tubes, No. 2	lb.	.05	@	.05 1/4
Inner tubes, Red	lb.	.05	@	.05 1/4

Cotton

Based on the final prediction of the Crop Reporting Board of the Department of Agriculture, i.e., that production of cotton from this season's American crop will total 12,407,000 bales, or 7,000 bales more than its November estimate, the price for spot cotton jumped 11 points today (December 8) to reach 12.71, a new high for the season. Prices for spot fluctuated sharply during the latter part of November, but started a steady advance in the last few days of the month which has continued into the current month. The market has been marked by an absence of speculative buying and hedging has lessened considerably. Because of backlogs of orders, mills are showing reluctance to accept business beyond March, although some domestic spinners are booked with orders at high prices for the entire year of 1937. Exports have fallen off sharply, but a decided pick-up is expected immediately after settlement of the prevailing strike of American seamen. Domestic demand is reported as "insatiable." Quotations for middling uplands on the N. Y. Cotton Exchange follow:

	Nov. 10	December 8		
	Close	High	Low	Close
December	11.69	12.36	12.19	12.35
March	11.65	12.19	12.02	12.11
June	11.61	11.89	11.89	11.89

Tire Fabrics

(Prices Net at the Mill)

Peeler, carded, 23/5/3	lb.	.33	@ .33 1/4
Peeler, carded, 23/4/3	lb.	.34	@ .34 1/4
Peeler, carded, 15/3/3	lb.	.31	@ .31 1/2
Peeler, carded, 13/3/3	lb.	.30	@ .30 1/2
Egyptian, carded, 23/5/3	lb.	.44 1/2	@ .45
Egyptian, combed, 23/5/3	lb.	.49 1/2	@ .50
CHAFERS			
Carded, American, 1 1/16"	lb.	.33	@ .34
Carded, American, 1"	lb.	.28	@ .32

Sheetings

48x40	36 in.	5.50	lb.	— @	.06
40x40	36 in.	6.15	lb.	— @	.05 7/8
40x36	36 in.	6.50	lb.	— @	.05 3/4
48x48	40 in.	2.50	lb.	— @	.11 1/4
48x48	40 in.	2.85	lb.	— @	.10
56x60	40 in.	3.60	lb.	— @	.09 1/2
48x44	40 in.	3.75	lb.	— @	.08
44x40	40 in.	4.25	lb.	— @	.07 1/4

Ducks

Enameling (single filling)	lb.	.27	@	.31
Belting and Hose	lb.	.28	@	—
Single filling, A grade	lb.	.12 1/2	@	.14 1/2
Double filling	lb.	.13	@	.15

Closing Rubber Prices on New York Commodity Exchange, Inc.

No. 1 Standard Contract of 10 tons

FROM NOVEMBER 11 TO DECEMBER 8

Date	Spot	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Sales
Nov. 11	....	....	....	....	....	....	....	....	....	....	....	....	....	....	...
12	17.60	17.55	17.58	17.61	17.64	17.68	17.74	17.74	17.74	17.73	17.76	17.80	17.83		...
13	17.75	17.67	17.69	17.72	17.73	17.73	17.75	17.76	17.77	17.78	17.80	17.81	17.84		166
14	17.88	17.82	17.85	17.86	17.88	17.90	17.92	17.94	17.95	17.97	17.99	18.01	18.04		92
15	....	....	....	....	....	....	....	....	....	....	....	....	....		...
16	18.06	18.04	18.06	18.07	18.09	18.10	18.12	18.13	18.17	18.16	18.17	18.18	18.21		230
17	18.18	18.16	18.18	18.21	18.23	18.25	18.26	18.26	18.27	18.27	18.28	18.30	18.32		215
18	18.18	18.16	18.18	18.19	18.20	18.23	18.24	18.27	18.27	18.28	18.29	18.30	18.32		155
19	18.22	18.20	18.22	18.23	18.23	18.24	18.25	18.27	18.27	18.27	18.27	18.25	18.27		168
20	18.22	18.14	18.16	18.19	18.22	18.26	18.27	18.28	18.28	18.27	18.28	18.30	18.32		75
21	18.18	18.06	18.08	18.10	18.12	18.14	18.15	18.16	18.16	18.17	18.17	18.18	18.19		39
22	....	....	....	....	....	....	....	....	....	....	....	....	....		...
23	18.18	18.05	18.05	18.07	18.10	18.14	18.14	18.14	18.14	18.14	18.15	18.17	18.19		85
24	18.22	18.18	18.18	18.19	18.20	18.23	18.23	18.23	18.23	18.23	18.23	18.23	18.24		75
25	18.31	....	18.27	18.29	18.32	18.36	18.36	18.35	18.36	18.37	18.37	18.37	18.38		134
26	....	....	....	....	....	....	....	....	....	....	....	....	....		...
27	18.56	....	18.55	18.55	18.55	18.55	18.55	18.56	18.56	18.57	18.57	18.58	18.58		297
28	18.56	....	18.54	18.55	18.55	18.55	18.55	18.55	18.55	18.55	18.55	18.55	18.55		34
29	....	....	....	....	....	....	....	....	....	....	....	....	....		...
30	18.50	....	18.46	18.46	18.46	18.46	18.46	18.46	18.46	18.46	18.46	18.46	18.46		110
Dec. 1	18.50	....	18.46	18.46	18.46	18.45	18.45	18.45	18.45	18.44	18.44	18.43	18.43	18.44	185
2	18.66	....	18.63	18.63	18.63	18.62	18.62	18.61	18.61	18.60	18.60	18.60	18.60	18.60	84
3	18.63	....	18.59	18.59	18.59	18.60	18.59	18.57	18.57	18.56	18.56	18.56	18.56	18.56	55
4	18.97	....	18.91	18.94	18.95	18.98	18.98	18.98	18.94	18.91	18.91	18.91	18.92	18.92	253
5	19.31	....	19.20	19.25	19.26	19.28	19.27	19.27	19.25	19.23	19.22	19.21	19.21	19.21	207
6	....	....	....	....	....	....	....	....	....	....	....	....	....	....	...
7	19.18	....	19.10	19.12	19.13	19.15	19.13	19.12	19.11	19.10	19.09	19.09	19.08	19.08	152
8	19.31	....	19.28	19.29	19.26	19.30	19.25	19.22	19.21	19.17	19.17	19.16	19.15	19.15	950

Rubber CHEMICAL Markets

NEW YORK, DECEMBER 10, 1936

[All Quotations F.O.B. Works Unless Otherwise Noted]

ACCELERATORS

Organic			
A-1 (Thiocarbanilid)	lb.	.24 @	.28
A-5-10	lb.	.33 @	.36
A-7	lb.	.53 @	.65
A-11	lb.	.60 @	.75
A-16	lb.	.55 @	.65
A-19	lb.	.56 @	.75
A-32	lb.	.70 @	.80
A-77	lb.	— @	—
Aldehyde ammonia, crystals	lb.	.65 @	.70
Altax	lb.	— @	—
Captax	lb.		
Crylene	lb.	.55 @	.65
paste	lb.	.45 @	.55
Di-Ortho-Tolyguanidine	lb.	.44 @	.47
Diphenylguanidine	lb.	.35 @	.37
El-Sixty	lb.	.55 @	.65
Ethylidene aniline	lb.	.45 @	.47½
Formaldehyde aniline	lb.	.37½ @	.42
Guantal	lb.	.42 @	.51
Heptene	lb.	.40 @	—
Hexamethylene-tetramine	lb.	.37 @	—
Lead Oleate, No. 999	lb.	.11 @	—
Witco	lb.	.11 @	—
Lithex	lb.	.18 @	.20
Methylenedianiline	lb.	.36 @	.37
Monex	lb.	3.25 @	—
Oxynone	lb.	.68 @	.80
Phenex	lb.	.50 @	.55
Pipsolene	lb.	1.60 @	1.85
R & H 40	lb.	.40 @	.41
R & H 50	lb.	.40 @	.41
R-2	lb.	1.50 @	1.80
Safex	lb.	1.20 @	1.25
SPDX	lb.	.75 @	—
Super-Sulphur No. 1	lb.		
No. 2	lb.		
Thiocarbanilid, drums	lb.	.24 @	.28
Trimene	lb.	.75 @	—
base	lb.	1.20 @	—
Triphenylguanidine	lb.	.58 @	.60
Tuads	lb.		
Ureka	lb.	.62 @	1.00
Ureka B	lb.	.62 @	.75
Ureka C	lb.	.58 @	.69
Vulcanex	lb.		
Vulcone	lb.		
Vulcanol	lb.		
Z-88-P	lb.	.48 @	.60
Zimate	lb.		
Inorganic			
Litharge, domestic	lb.	.06½ @	.07
Magnesia, calcined, heavy	lb.	.04 @	—

COLORS

Blacks (See Compounding Materials)

Blues			
Prussian	lb.	.37 @	.39
Ultramarine	lb.	.15 @	—
Browns			
Sienna, Italian	lb.	.06 @	'13
Umber, Turkey	lb	.04 @	.04½
Greens			
Chrome, light	lb.	.20 @	.30
medium	lb.	.21 @	.31
Chromium Oxide, bbl.	lb.	.19 @	.20
Guignet's Green	lb.	.70 @	—
Reds			
Antimony			
crimson, 15/17	lb.	.48 @	—
sulfur, free	lb.	.48 @	.60
Indian English	lb.	.09 @	.10
Domestic (Maroon)	lb.	.11 @	—
Red oxide, pure	lb.	.10 @	.12
Rub-Er-Red, f.o.b. Easton	lb.	.09¼ @	—
Whites			
Cryptone CB, No. 21	lb.	.06 @	.06¼
Cryptone, No. 19	lb.	.06 @	.06¼
Cryptone, ZS-20	lb.	.10½ @	.10¾
Cryptone, ZS-86	lb.	.10½ @	.10¾
Lithopone			
Albalith, black label—11	lb.	.04½ @	.04¾
Azolith	lb.	.04½ @	.04¾
Rayox	lb.		
Titanox A	lb.	.16 @	.17
Titanox B	lb.	.05¾ @	.06¼
Titanox C	lb.	.05¾ @	.06¼
Zinc Oxide—American Process			
American Azo:			
ZZZ (lead free)	lb.	.05¼ @	.05½
Anaconda, lead free	lb.	.05¼ @	.05½
Horsehead Lead Free Brand:			
Special—3	lb.	.05¼ @	.05½
XX Red—4	lb.	.05¼ @	.05½
XX Red—72	lb.	.05¼ @	.05½
XX Red—78		.05¼ @	.05½
XX Red—103	lb.	.05¼ @	.05½
U. S. P.—7, bbls.	lb.	.05¼ @	.05½
Kadox, black label—15	lb.	.05¼ @	.05½
Blue label—16	lb.	.05¼ @	.05½
Red label—17	lb.	.05¼ @	.05½
St. Joe, black label	lb.	.05¼ @	.05½
green label	lb.	.05¼ @	.05½
red label	lb.	.05¼ @	.05½
Zinc Oxide—French Process			
Florence White seal—7 bbls.	lb.	.06¾ @	.07
Green seal——8	lb.	.06¼ @	.06½
Red seal—9	lb.	.05¾ @	.06
Yellows			
Chrome	lb.	.11 @	.12
Ocher, dom. med.	lb.	.02¾ @	—

BLACKS

Arrow "Aerfloted" Specification	lb.	.0535 @	.0825
Bone, powdered	lb.	.05½ @	.12½
Carbon, compressed	lb.	.0535 @	.0825
uncompressed	lb.	.0535 @	.0825
"Certified," Cabot	lb.	.0535 @	.0825
Spherons	lb.	.0535 @	.0825
"Disperso"	lb.	.0535 @	.0825
Drop, bbls.	lb.	.05½ @	.14
"Excello," compressed	lb.	.0535 @	.0825
"Fumonex"	lb.	.03 @	.07
"Gastex"	lb.	.03 @	.07
Lampblack	lb.	.07 @	.12
"Micronex"	lb.	.0535 @	.0825
"Supreme"	lb.	.0535 @	.0825
Thermatomic—"P 33"	lb.	— @	—
"Thermax"	lb.	— @	—
United "Dixie" & "Kosmos"	lb.	.0535 @	.0825

COMPOUNDING MATERIALS

Aluminum Flake	ton.	21.85 @	24.50
Ammonia carbonate, lump	lb.	.10½ @	.12
Asbestine	ton	13.00 @	15.00
Barium carbonate (98-100%)	ton	56.50 @	61.50
Barium Dust	lb.	.05 @	.06
Barytes	ton	23.65 @	31.15
Basofor	lb.	.04½ @	—
Bentonite	lb.	.02 @	.03
Blanc fixe dry f.o.b. works	ton	70.00 @	75.00
Calcene	ton	37.50 @	45.00
Catalpo (fact.)	lb.	.02 @	—
Chalk, precipitated			
Suprex white, extra lt.	ton	45.40 @	60.00
heavy	ton	45.00 @	55.00
Clay, Kaolin, domestic	ton	7.50 @	15.00
Aerfloted, Suprex	ton	8.50 @	10.00
Congaree	ton	9.00 @	—
Dixie	ton		
Dixie, Jr.	ton		
McNamee	ton		
Par	ton		
Tensulite		15.00 @	—
Witco	ton	8.50 @	9.00
Cotton Flock	lb.	.11 @	.15
Glues, extra white	lb.	.28 @	.30
medium white	lb.	.14 @	.19
Kalite No. 1	ton	30.00 @	55.00
Kalite No. 3	ton	40.00 @	65.00
Magnesium carbonate	lb.	.08 @	—
Mica	ton	35.00 @	—
Pyrax A	ton	— @	—
Rottenstone (powdered)	lb.	.02½ @	.05
Soapstone, powdered	ton	16.00 @	22.00
Starch, powdered	cwt.	3.19 @	3.39
Talc, domestic	ton	16.00 @	18.00
Whiting, commercial	ton	17.00 @	18.00
Columbia Filler	ton	9.00 @	14.00
English Cliffstone	ton	33.00 @	43.00
Sussex	ton		
Witco	ton	7.00 @	—
Wood Flour	ton	18.00 @	30.00
Zinc Carbonate	lb.	.10½ @	.11
Zinc Stearate	lb.	.26 @	—

MINERAL RUBBER

Black Diamond	ton	27.00 @	—
Genasco, solid (factory)	ton	25.00 @	27.00
Hard Hydrocarbon	ton		
Parmr, solid	ton	31.00 @	—
Pioneer, MR, solid	ton		
Pioneer-granulated	ton		

SPECIALTIES

Aromatics—Rodo	lb.		
Para-Dors No. 5145	lb.	2.00 @	—
Sunproof	lb.	.35 @	.37½
Sponge Paste	lb.	— @	.80
Tonox	lb.	.56 @	.60

SOFTENERS

Acids			
Acetic, 28%, bbls.	100 lb.	2.45 @	2.70
glacial, USP, bbls.	100 lb.	14.00 @	—
Nitric, 36 degrees	cwt.	5.00 @	6.00
Sulfuric, 66 degrees	ton	15.50 @	16.50
Acids, Fatty			
Laurex	lb.	.15 @	.16
Stearex	lb.	.08½ @	.11¾
Stearic, double pressed	lb.	.10 @	.11
Stearite	lb.	.09¼ @	.10½
Alkalies			
Caustic Soda, 76%	cwt.	3.60 @	3.75
Soda Ash, 58% C.L.	cwt.	2.52 @	—

Oils			
Corn, refined, bbls.	lb.	.11½ @	.11¾
Cottonseed, crude	gal.	.093 @	.10
Cycline Oil	gal.	.15 @	.28
Degras, bbls.	lb.	.05¼ @	.06¾
Fluxrite	lb.	.05½ @	.06½
Palm Lagos	lb.	.05 @	—
Niger	lb.	.04¾ @	—
Para-Flux	gal.	.17 @	—
Petrolatum, light	lb.	.03½ @	.03¾
Pigmentaroil, tank cars	gal.	.16 @	—
in drums	gal.	.22 @	.23½
Pine, steam distilled	gal.	.64 @	.65
dest. dist., drums	gal.	.44 @	.46
Rosin Oil, cmpd.	gal.	.40 @	—
Rubtack	lb.	.40 @	—
Seedine, c.l.	lb.	.07¾ @	—
Tackol	lb.	.08½ @	.18
Witco Palm Oil	lb.	.05½ @	—
Witco Softener	gal.	.15 @	—
Woburn No. 8, c.l.	lb.	.06 @	—
Wobonite, c.l.	lb.	.05 @	—
Resins and Pitches			
Pitch, Burgundy	lb.	.03½ @	—
coal tar	gal.	.07½ @	.08
hardwood	ton	15.00 @	—
pine, 200 lb. gr. wt.	bbl.	4.00 @	4.50
Rosin, grade K, 280 lb.	bbl.	5.90 @	—
Pigmentar, tank cars	gal.	.19 @	—
in drums	gal.	.25 @	.27
R. S. L. Resin	lb.	— @	—
Retort Pine Tar, drums	bbl.	12.00 @	13.00
Solvents			
Acetone, pure	lb.	.08½ @	—
Alcohol, denatured, methanol, No. 1 bbls.	gal.	.28 @	.39
Benzene, 90%	gal.	.18 @	.23
Beta-Trichlorethane	gal.	— @	—
Bondogen	lb.	— @	—
Carbon, bisulfide	lb.	.05¼ @	.08
Carbon, tetrachloride	lb.	.05¾ @	—
Dichlorethylene	lb.	.29 @	—
Dipentene, cml., drums	gal.	.41 @	.44
Dryolene (f.o.b. Okla.)	gal.	.10 @	.10½
Ethylene dichloride	lb.	.05½ @	.06½
Gasoline, steel bbls.	gal.	.16 @	—
Naphtha, solvent	gal.	.31 @	—
Plastogen	lb.		
Reogen	lb.		
Rub-Sol (f.o.b. Okla.)	gal.	.09 @	—
Trichlorethylene	lb.	— @	.09½
Turpentine, spirits	gal.	.50 @	—
dest. dist., drums	gal.	.47 @	—
Waxes			
Beeswax, white	lb.	.34 @	.35
Carnauba, yellow	lb.	.45 @	.46½
Ceresin, white, dom.	lb.	.08 @	.11
Montan, crude	lb.	.10¾ @	.11¾
Paraffin (c.l.—f.o.b. N. Y.)			
Yellow crude scale	lb.	.03½ @	—
White crude scale 124/126	lb.	.03 @	—
Refined, 122/127	lb.	.04½ @	—

ANTI-OXIDANTS

AgeRite, Gel	lb.		
HP	lb.		
Powder	lb.		
Resin	lb.		
White	lb.		
Albasan	lb.	.70 @	.75
Antox	lb.		
B-L-E	lb.	.57 @	.60
Flectol-H	lb.	.54 @	.65
Flectol White	lb.	.95 @	1.15
Flectol B	lb.	.54 @	.65
Neozone	lb.		
Oxynone	lb.	.66 @	.75
Perfectol	lb.	.67 @	.75
Retardex	lb.	.35 @	.40
Stabilite	lb.	.57 @	.62
Stabilite Alba	lb.	.70 @	.75
VGB	lb.	.55 @	.60

MOLD LUBRICANTS

Aresklene	lb.	— @	—
Cocoa Soapstock	lb.	.06 @	.08
Dipex	lb.	.06 @	.08
Laurex	lb.	.24 @	.30
Lubrex	lb.	.25 @	.30
Rusco, f.o.b. Nitro	lb.	.12 @	.30
Sericite, f.o.b. N. Y.	ton	65.00 @	—
Soap Tree Bark, cut, sifted	lb.	.06 @	.08

FACTICE OR RUBBER SUBSTITUTES

Amberex	lb.	.26 @	—
Black	lb.	.08½ @	—
White	lb.	.08½ @	.13
Brown	lb.	.08 @	.14
Duphax	lb.	.11 @	—

VULCANIZING INGREDIENTS

Sulfur Chloride, yellow (drs.)	lb.	.03½ @	.04½
Sulfur flour.			
Refined, 100% pure (bags)	cwt.	2.55 @	3.15
Commercial (bags)	cwt.	1.60 @	2.35
Telloy	lb.		
Vandex	lb.		

Crude Rubber
Latex and Guayule
Reclaimed Rubber
Tires and Tubes

STATISTICS OF THE INDUSTRY

Rim Production
Automobiles
Gasoline
Cotton Prices

U. S. Imports and Exports of Crude Rubber

YEARS	Gross Imports: Long Tons	Total Declared Value	Average Declared Value per pound Cents	Re-exports: Long Tons	Total Declared Value	Average Declared Value per pound Cents	Net Imports: Long Tons
1922	301,075	101,843,188	15.10	4,809	1,921,828	17.84	296,267
1923	309,144	185,060,304	26.72	8,772	5,672,319	28.87	300,372
1924	328,056	174,231,331	23.71	10,309	6,057,637	26.23	317,747
1925	396,642	429,705,014	48.36	14,827	19,847,753	59.76	381,815
1926	413,338	505,817,807	54.63	17,671	22,470,583	56.77	395,667
1927	426,258	339,874,774	35.60	27,775	24,735,488	39.76	398,483
1928	439,731	244,854,973	25.03	32,159	18,128,361	25.17	407,572
1929	560,084	239,178,783	19.15	36,485	16,868,733	20.64	523,599
1930	482,082	139,134,330	12.89	30,205	9,316,205	13.77	451,877
1931	497,138	72,918,949	6.54	25,595	4,255,472	7.42	471,543
1932	409,584	31,936,459	3.47	20,929	2,015,612	4.30	388,655
1933	407,817	44,034,064	4.82	20,537	2,601,352	5.65	427,280
1934	449,322	97,898,519	9.73	23,848	5,770,109	11.23	425,615
1935	453,135	115,299,448	11.36	11,389	3,084,331	12.09	441,746
1934:							
Dec.	17,590	4,974,374	12.62	866	240,780	12.46	16,724
1935:							
Jan.	39,675	10,852,308	12.21	977	278,229	12.72	38,698
Feb.	47,271	12,291,242	11.61	1,845	480,440	11.62	45,426
March	45,350	11,801,152	11.62	1,868	486,379	11.62	43,482
April	39,735	10,096,487	11.34	1,096	285,903	11.64	38,639
May	29,278	7,171,025	10.98	793	202,402	11.39	28,485
June	31,240	7,523,598	10.75	524	153,595	13.10	30,716
July	46,987	11,666,577	11.08	489	132,173	12.06	46,498
August	40,249	10,419,056	11.56	476	130,464	12.23	39,773
Sept.	34,659	8,637,048	11.12	468	120,438	11.48	34,191
Oct.	35,091	8,742,222	11.12	651	188,518	12.92	34,440
Nov.	25,050	6,137,160	10.94	380	101,793	11.95	24,670
Dec.	38,417	9,930,710	11.54	1,821	523,997	12.85	36,596
1936:							
Jan.	32,255	8,624,060	11.94	732	229,129	13.98	31,523
Feb.	32,879	9,293,711	12.62	625	199,956	14.27	32,254
Mar.*	33,447	9,845,776	13.14	1,172	390,551	14.88	32,275
Apr.*	44,218	13,967,712	14.10	984	343,785	15.59	43,234
May*	35,578	11,460,157	14.38	1,589	580,021	16.30	33,989
June	36,376	12,073,632	14.82	2,469	904,669	16.35	33,907
July	38,178	12,763,200	14.92	1,383	510,075	16.47	36,795
Aug.	40,027	13,364,916	14.91	840	307,114	16.32	39,187
Sept.	48,233	16,644,668	15.41	656	244,554	16.64	47,577
Oct.	39,573	13,627,465	15.37	778	268,645	15.42	38,795

* Revised.
Note: Total 1935 figures (revised) subject to further revision.

United States Imports of Guayule, Balata, Jelutong, Liquid Latex

(All Quantities in Long Tons)

	Guayule Tons	Guayule Dollars	Balata Tons	Balata Dollars	Jelutong Tons	Jelutong Dollars	Liquid Latex (1) Tons	Liquid Latex (1) Dollars
1924	1,356	536,392	464	568,456	6,165	1,237,100	2,157	864,659
1925	3,781	1,803,448	517	574,750	6,749	1,642,531	3,853	3,537,810
1926	4,305	2,562,096	354	327,213	7,263	3,127,757	3,388	4,680,386
1927	5,018	2,674,957	582	447,246	7,785	2,448,657	1,116	876,077
1928	3,075	1,755,685	731	430,855	7,552	2,540,059	4,167	2,185,579
1929	1,231	545,175	728	566,964	8,203	2,458,136	3,728	1,787,997
1930	1,096	347,388	501	422,684	5,907	1,403,244	4,449	1,506,804
1931	—	—	1,208	411,692	5,777	1,019,010	4,650	884,355
1932	—	—	708	147,403	4,607	616,596	5,085	601,999
1933	—	—	1,658	2,261,869	5,989	944,895	11,085	1,833,671
1934	402	75,349	1,054	438,209	4,988	943,752	13,070	3,633,253
1935	468	86,835	626	188,384	5,747	1,063,126	13,553	3,782,222
1935:								
Oct.	48	8,112	27	7,641	208	33,262	1,287	342,101
Nov.	70	11,931	39	11,706	269	50,657	1,023	261,668
Dec.	91	15,317	62	18,269	414	71,885	1,395	391,386
1936:								
Jan.	70	13,182	30	8,924	656	133,948	1,667	474,682
Feb.	75	14,127	100	34,389	396	84,635	1,459	406,985
Mar.	40	7,605	65	23,590	378	70,560	1,427	417,704
April	103	19,469	38	15,232	751	146,548	1,612	522,049
May	88	16,698	59	21,217	521	114,099	1,472	490,769
June	97	18,380	33	13,671	767	186,274	1,897	657,311
July	96	18,168	44	15,314	556	106,676	1,665	579,895
Aug.	146	37,147	72	23,715	321	64,769	1,761	602,992
Sept.	106	29,335	21	9,846	418	85,624	1,800	692,810
Oct.	114	31,489	11	4,815	452	102,485	1,392	500,817

(1) Weight given in pounds of dry rubber contained in latex.
Note: Total 1935 figures (revised) subject to further revision.

U. S. Consumption of Crude Rubber

(Rubber Manufacturers' Association statistics raised to 100 per cent—All figures in long tons)
(All Quantities in Long Tons)

	Figures on Monthly Basis: 1929	1930	1931	1932	1933	1934	1935	1936
Jan.	43,002	36,194	28,557	29,648	22,645*	39,190*	47,103	48,506
Feb.	41,594	33,302	28,797	31,821	21,392*	40,515*	43,187	36,746
Mar.	44,730	35,540	32,788	29,505	17,483*	47,003*	42,620	42,703
Apr.	47,521	39,686	33,321	27,518	25,928	44,853*	44,247*	51,897
May	49,233	39,386	37,817	30,957	44,074	42,918*	41,101*	50,482
June	43,227	34,195	37,916	41,475	50,743*	40,147*	36,156*	52,636
July	41,526	29,508	31,397	29,976	49,614*	32,553*	35,917*	48,127
Aug.	38,274	30,850	27,586	23,721	44,428*	33,216*	38,775*	46,657
Sept.	34,707	25,515	23,638	23,847	35,281*	30,258*	37,086*	46,330
Oct.	34,800	27,516	22,277	22,286	31,543*	31,253*	41,969*	49,509
Nov.	27,659	23,691	22,943	23,231	28,831*	34,748*	42,778	
Dec.	25,531	21,687	21,409	18,015	28,757*	36,569*	42,942	
Tot.	469,804	375,980	348,986	332,000	400,719*	453,223*	494,348*	

* Revised.

Reclaimed Rubber in the United States

(All Quantities in Long Tons)

Year	Production	Consumption Tons	Consumption % to Crude	Stocks*	Year	Production	Consumption Tons	Consumption % to Crude	Stocks*
1926	180,582	164,500	45.9	23,213	1931	133,351	124,126	33.9	19,257
1927	189,144	178,471	47.6	24,980	1932	75,608	77,504	23.4	16,354
1928	208,516	223,000	50.4	24,785	1933	99,560	81,602	19.9	20,746
1929	218,954	226,589	48.4	27,464	1934	110,010	100,597	22.2	23,079
1930	157,967	153,497	40.8	22,000	1935	122,948	112,712	22.7	25,069
Figures on Monthly Basis:									
1935:									
Jan.	10,465	11,261	23.9	22,291	July	8,421	8,396	23.4[a]	17,810
Feb.	10,072	9,374	23.3	22,989	Aug.	9,557	8,795	22.7[a]	18,272
Mar.	10,549	9,741	22.9	20,637	Sept.	9,041	8,764	23.6[a]	18,260
Apr.	10,315	10,466	23.7[a]	18,716[a]	Oct.	11,926	9,662	23.0[a]	19,640
May	10,223	9,938	24.2[a]	18,541	Nov.	11,482	9,084	21.2	21,478
June	8,590	8,710	24.1[a]	17,932	Dec.	12,307	8,521	19.8	25,069
1936:									
Jan.	11,665	10,039	20.7	26,145	July	12,330	11,816	24.6	22,602
Feb.	10,188	7,366	20.1	28,267	Aug.	12,856	10,993	23.6	23,750
Mar.	10,712	8,767	20.5	29,161	Sept.	12,959	11,170	24.1	24,950
April	11,382	10,333	19.9	22,274	Oct.	14,737	12,606	25.7	26,389
May	11,512	10,396	20.6	22,852	Nov.	.....	.....	...	.....
June	11,935	11,548	21.9	22,738	Dec.	.....	.....	...	.....

* Stocks on hand at the end of month or year.
[a] Revised.

U. S. Consumption of Gasoline

(Bureau of Mines Statistics)
(In Thousands of Barrels of 42 Gallons)

	1934*	1935*	1936		1934*	1935*	1936
January	29,489	28,062	32,553	August	39,105	42,836	46,081
February ...	25,310	26,432	27,401	September .	34,669	37,862	44,346
March	30,577	31,997	35,871	October	37,674	41,401	44,253
April	32,736	36,082	38,825	November ..	34,998	35,956	
May	38,071	39,095	42,007	December ..	30,581	33,734	
June	36,430	37,890	44,630				
July	37,466	41,209	46,692	Total	407,106	432,556	

* Revised on basis of final annual figures issued by Bureau of Mines.

Rims Inspected and Passed in U. S.

(Tire and Rim Association Reports)

	Total		Total		Total
1924	21,863,311	1928	24,247,282	1932	6,261,336
1925	26,001,664	1929	24,141,502	1933	8,713,962
1926	24,199,524	1930	17,364,096	1934	12,255,118
1927	19,700,003	1931	11,253,800	1935	18,664,356

1936:		1936:		1936:	
January ...	1,877,448	May	1,959,425	September ..	1,104,404
February ..	1,260,590	June	1,876,446	October ...	1,846,750
March	1,840,723	July	1,716,463	November ..	2,173,408
April	2,258,296	August	934,595	December ..	.....

Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—*New York Market, in Cents per Pound*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Ave.
1934																																
August	14 1/8	14 5/8	15	—	—	15 1/8	15 3/8	15 3/8	15 3/8	15 5/8	15 5/8	—	15 3/8	15 1/2	15 1/2	15 7/8	15 7/8	13 7/8	—	—	15 7/8	15 1/2	15 3/4	15 3/4	15 3/4	—	—	15 3/4	15 3/4	—	15 3/4	15 1/2
September	—	—	—	15 5/8	—	15 3/8	15 3/4	15 3/4	—	15 5/8	15 1/8	15 1/8	15 3/8	15 3/4	15 1/4	15 1/8	—	—	—	15 7/8	15 1/8	15 3/8	—	—	15 5/8	15 5/8	15	14 7/8	14 1/8	14 1/8	14 1/8	15 3/8
October	14 1/2	14 1/2	13 7/8	14	—	13 7/8	—	13 7/8	—	13 7/8	14 1/8	14 1/8	—	14 1/8	14 1/8	14 1/8	14	14	15	14	14	14 1/8	14 1/8	14 1/8	13 7/8	—	13 7/8	—	14	13	13	14
November	13 3/4	13 3/4	13	—	13	—	13 3/8	—	13 3/4	—	13 3/4	13 3/4	13 3/4	13 7/8	13 1/4	14 1/4	14	14	14 1/4	13	12 1/2	12 3/4	12 3/4	12 3/8	—	13 1/4	13 1/4	13 1/4	13	13 1/4	—	13
December	13 1/8	—	12 7/8	13	13	13 3/8	13 7/8	13 7/8	—	12 1/8	12 7/8	12 1/8	12 5/8	12 1/8	13	—	13	13	13	13	12 1/8	12 1/8	—	12 1/8	—	12 7/8	12 7/8	12 5/8	—	—	13 1/8	—
1935																																
January	—	13 1/8	13 1/2	13 1/2	13 1/2	—	13 3/4	13 3/4	13 5/8	13 3/4	13 3/4	13 1/4	—	13 1/4	12 7/8	13	13	13	13	13	13	13	12 1/8	12 7/8	12 3/4	12 5/8	—	12 5/8	12 5/8	12 1/8	12 3/4	13 1/8
February	13 1/8	13 1/8	13 1/2	12 3/4	12 3/4	12 5/8	13	13	13 1/8	13 1/8	13 1/8	13 1/8	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
March	12 5/8	12 5/8	12 3/4	12 3/4	12 3/4	12 7/8	12 7/8	12 7/8	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
April	11 3/8	11 3/8	11	11	11	11	10 7/8	10 7/8	10 7/8	10 7/8	10 7/8	10 7/8	10 7/8	10 7/8	10 7/8	10 7/8	10 7/8	10 7/8	10 7/8	10 7/8	10 7/8	10 7/8	10 7/8	10 7/8	10 7/8	10 7/8	10 7/8	10 7/8	10 7/8	10 7/8	10 7/8	10 7/8
May	11	11 1/2	11 1/4	11 1/2	12 1/2	12 1/2	11 7/8	11 5/8	11 5/8	11 5/8	11 5/8	11 5/8	11 5/8	11 5/8	11 5/8	11 5/8	11 5/8	11 5/8	11 5/8	11 5/8	11 5/8	11 5/8	11 5/8	11 5/8	11 5/8	11 5/8	11 5/8	11 5/8	11 5/8	11 5/8	11 5/8	11 5/8
June	12 1/8	12 1/8	12 1/8	12 1/2	12 1/2	12 1/4	12 1/4	12 3/8	12 3/8	12 3/8	12 3/8	12 3/8	12 3/8	12 3/8	12 3/8	12 3/8	12 3/8	12 3/8	12 3/8	12 3/8	12 3/8	12 3/8	12 3/8	12 3/8	12 3/8	12 3/8	12 3/8	12 3/8	12 3/8	12 3/8	12 3/8	12 3/8
July	12 1/8	12 1/8	12 1/4	—	—	12 1/4	12 1/8	12 1/8	12 1/8	12 1/8	12 1/8	12 1/8	12 1/8	12 1/8	12 1/8	12 1/8	12 1/8	12 1/8	12 1/8	12 1/8	12 1/8	12 1/8	12 1/8	12 1/8	12 1/8	12 1/8	12 1/8	12 1/8	12 1/8	12 1/8	12 1/8	12 1/8
August	12 1/4	12 1/4	—	—	—	12 1/4	11 7/8	12	12	11 7/8	11 7/8	12 1/8	11 7/8	11 7/8	12	11 7/8	11 7/8	11 7/8	11 7/8	11 7/8	11 7/8	11 7/8	11 7/8	11 7/8	11 7/8	11 7/8	11 7/8	11 7/8	11 7/8	11 7/8	11 7/8	11 7/8
September	12 1/8	12 1/8	11 1/2	11 1/8	11 1/8	11 1/8	11 1/8	12	12	12	11 7/8	12 1/8	11 7/8	11 7/8	12	12	11 7/8	11 7/8	11 7/8	11 7/8	12	12	12	12	12	12	12	12	12	12	12	12
October	11 1/8	11 1/8	11 1/2	11 1/8	11 1/8	11 1/8	11 1/8	11 1/8	11 1/2	11 1/2	11 1/2	11 1/2	11 1/2	11 1/2	12 1/2	12 1/2	11 1/2	11 1/2	11 1/2	11 1/2	11 1/2	11 1/2	11 1/2	11 1/2	11 1/2	11 1/2	11 1/2	11 1/2	11 1/2	11 1/2	11 1/2	11 1/2
November	11 3/4	11 3/4	11 7/8	12	12	12	12	12	12 1/4	12 1/4	12 1/4	12 1/4	12 1/4	12 1/4	12 3/4	12 3/4	12 3/4	12 3/4	12 3/4	12 3/4	12 3/4	12 3/4	12 3/4	12 3/4	12 3/4	12 3/4	12 3/4	12 3/4	12 3/4	12 3/4	12 3/4	12 3/4
December	13 1/8	13 1/8	12 3/4	12 7/8	13	13	13	13 1/4	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
1936																																
January	—	13 1/2	13 3/8	13 5/8	—	13 3/4	13 7/8	13 7/8	13 7/8	14	14 1/8	—	14 1/8	14 1/8	14 1/8	14 1/8	14 1/8	14 1/8	—	14 3/8	14 1/2	14 5/8	—	15	15	15	15 1/2	15 1/8	14 1/8	14 1/8	14 1/8	14 1/8
February	—	15 5/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	16	15 7/8	—	16	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8
March	15 1/8	15 5/8	15 5/8	15 3/4	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8	15 7/8
April	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8
May	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8	15 1/8
June	15 3/8	15 3/8	15 3/4	15 3/4	15 3/4	15 3/4	15 3/4	15 3/4	15 3/4	15 3/4	15 3/4	15 3/4	15 3/4	15 3/4	15 3/4	15 3/4	15 3/4	15 3/4	15 3/4	15 3/4	15 3/4	15 3/4	15 3/4	15 3/4	15 3/4	15 3/4	15 3/4	15 3/4	15 3/4	15 3/4	15 3/4	15 3/4
July	16 1/8	16 1/8	16 1/8	16 1/8	16 1/4	16 1/4	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/4	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8
Aug.	16 1/8	16 1/8	16 1/8	16 1/8	16 1/4	16 1/4	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8
Sept.	16 1/8	16 1/8	16 1/8	16 1/8	16 1/4	16 1/4	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8
Oct.	16 1/8	16 1/8	16 1/8	16 1/8	16 1/4	16 1/4	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8
Nov.	16 1/8	16 1/8	16 1/8	16 1/8	16 1/4	16 1/4	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8	16 1/8
Dec.	17 1/8	18 5/8	18 5/8	17 1/2	19	19 3/8	19 3/8	19 7/8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Average Spot Closing Prices—Ribbed Smoked Sheets

(New York Market)

Average Price per Pound for Years 1910-1929

Year	Cents	Year	Cents	Year	Cents	Year	Cents	Year	Cents
1910	206.60	1914	65.33	1918	60.15	1922	17.50	1926	48.50
1911	141.30	1915	65.85	1919	48.70	1923	29.45	1927	37.72
1912	121.60	1916	72.50	1920	56.30	1924	26.20	1928	22.48
1913	82.04	1917	72.23	1921	16.36	1925	72.46	1929	20.58

Average Monthly Price per Pound Since 1930

	1930 Cents	1931 Cents	1932 Cents	1933 Cents	1934 Cents	1935 Cents	1936 Cents
Jan.	15.24	8.34	4.38	3.08	9.32	13.10	14.35
Feb.	15.85	7.70	4.03	2.95	10.45	12.92	15.48
Mar.	15.34	7.71	3.35	3.01	11.01	11.51	15.89
Apr.	14.93	6.43	3.02	3.56	12.10	11.55	15.98
May	14.24	6.49	3.09	4.95	13.26	12.05	15.62
June	12.45	6.35	2.66	6.15	13.51	12.57	15.85
July	11.24	6.37	2.89	8.01	14.60	12.10	16.49
Aug.	9.96	5.38	3.63	7.31	15.47	11.98	16.25
Sept.	8.28	5.08	3.84	7.30	15.36	11.55	16.46
Oct.	8.20	4.87	3.65	7.64	13.96	12.62	16.55
Nov.	9.01	4.65	3.44	8.66	13.04	13.15	17.97
Dec.	9.05	4.64	3.24	8.87	12.98	13.28	
Average for Year	11.98	6.17	3.49	5.96	12.92	12.37	

London Closing Prices of Ribbed Smoked Sheets

(In Pence Per Pound)

Day	1936 Sept.	1936 Oct.	1936 Nov.	1936 Dec.	Day	1936 Sept.	1936 Oct.	1936 Nov.	1936 Dec.
1	7 1/16	7 3/4	—	8 1/16	17	7 1/16	7 7/8	8 1/16	
2	7 1/16	7 3/4	8 1/4	8 7/16	18	7 1/16	—	8 1/16	
3	7 1/16	7 1/16	8 1/4	8 1/16	19	—	7 7/8	8 5/16	
4	7 1/16	—	8 3/8	9	20	—	7 7/8	8 1/16	
5	—	7 1/16	8 1/8	9 1/16	21	7 1/16	7 1/16	8 1/16	
6	—	7 7/8	8 1/8	—	22	7 1/16	7 1/16	—	
7	7 5/8	7 1/16	8 1/16	9 1/16	23	7 1/16	7 7/8	8 5/8	
8	7 5/8	7 1/16	—	9 1/16	24	7 1/16	7 7/8	8 7/8	
9	7 5/8	7 7/8	8 7/16		25	7 3/4	—	8 1/16	
10	7 5/8	7 7/8	8 5/8		26	—	7 7/8	8 1/16	
11	7 5/8	—	8 1/8		27	—	8 1/16	8 1/16	
12	—	7 1/16	8 1/2		28	7 5/8	8	8 1/16	
13	—	7 1/16	8 1/2		29	7 1/4	8	—	
14	7 5/8	7 7/8	8 1/16		30	7 1/16	8 1/16	8 3/4	
15	7 5/8	7 7/8	—		31	—	8 1/4	—	
16	7 1/16	7 7/8	8 5/8						

Average Monthly Price Per Pound

Month	1933 Pence	1934 Pence	1935 Pence	1936 Pence	Month	1933 Pence	1934 Pence	1935 Pence	1936 Pence
Jan.	2.264	4.429	6.434	6.758	Aug.	3.811	7.401	5.696	7.581
Feb.	2.093	4.920	6.292	7.255	Sept.	3.728	7.409	5.508	7.577
Mar.	2.099	5.136	5.745	7.450	Oct.	3.957	6.806	6.130	7.898
Apr.	2.323	5.712	5.604	7.502	Nov.	4.096	6.294	6.308	8.572
May	2.966	6.207	5.822	7.335	Dec.	4.200	6.295	6.340	
June	3.392	6.245	6.027	7.352	Average for				
July	3.860	7.053	5.801	7.696	Year	3.233	6.159	5.976	

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market)

Recent Daily Price Per Pound

Date	1936 Oct.	1936 Nov.	1936 Dec.	Date	1936 Oct.	1936 Nov.	1936 Dec.	Date	1936 Oct.	1936 Nov.	1936 Dec.
1	12.64	—	12.58	11	—	—		22	12.22	—	
2	12.53	12.08	12.63	12	—	12.10		23	12.18	12.10	
3	12.45	—	12.64	13	12.37	12.15		24	12.13	12.13	
4	—	12.25	12.64	14	12.45	12.18		25	—	12.25	
5	12.48	12.34	12.56	15	12.41	—		26	12.01	—	
6	12.37	12.27	—	16	12.45	12.29		27	12.16	12.27	
7	12.36	12.35	12.60	17	12.42	12.30		28	12.12	12.36	
8	12.39	—	12.71	18	—	12.20		29	12.11	—	
9	12.29	12.24		19	12.35	12.23		30	12.06	12.43	
10	12.21	12.14		20	12.32	12.18		31	12.08	—	
				21	12.25	12.22					

Average Monthly Price Per Pound

	1933 Cents	1934 Cents	1935 Cents	1936 Cents		1933 Cents	1934 Cents	1935 Cents	1936 Cents
Jan.	6.23	11.25	12.70	11.91	Aug.	9.55	13.40	11.48	12.28
Feb.	6.05	12.28	12.58	11.53	Sept.	9.64	13.00	10.80	12.31
Mar.	6.39	12.30	11.63	11.43	Oct.	9.58	12.48	11.28	12.30
Apr.	7.02	11.80	11.73	11.71	Nov.	10.04	12.53	12.01	12.23
May	8.64	11.44	12.25	11.68	Dec.	10.17	12.76	11.99	
June	9.47	12.20	11.89	12.02	Average for				
July	10.76	12.84	12.26	13.11	Year	8.63	12.36	11.88	

World Stocks of Crude Rubber

(All figures are in long tons)

ON HAND OR AFLOAT TO THE U. S.

At End of	ON HAND 1934	ON HAND 1935	ON HAND 1936	AFLOAT 1934	AFLOAT 1935	AFLOAT 1936	ON HAND AND AFLOAT 1934	ON HAND AND AFLOAT 1935	ON HAND AND AFLOAT 1936
Jan.	370,039	349,446	285,054*	45,768	42,066	43,870	415,807	391,512	328,924*
Feb.	358,423	340,264	282,902*	53,063	42,969	46,532	411,486	383,233	329,434*
Mar.	353,078	340,284	276,823*	54,722	44,485	58,935	407,800	384,769	335,758*
Apr.	351,073	337,586	264,228*	56,251	37,651	47,678	407,324	375,237	311,906*
May	350,935	322,558	248,317	57,921	44,375	48,860	408,856	366,933	297,177
June	358,461	324,218	245,886	46,698	55,581	47,228	405,159	379,799	293,114
July	365,072	334,692	234,498	45,869	49,018	60,343	410,941	383,710	294,841
Aug.	363,711	334,106	229,056	40,278	47,724	63,597	403,989	381,830	292,653
Sept.	360,623	331,121	228,477	38,831	43,413	62,240	399,454	374,534	290,717
Oct.	362,571	322,857	219,553	38,247	49,913	67,825	400,818	371,770	287,378
Nov.	362,826	308,993		38,625	46,588		401,451	355,581	
Dec.	355,000	303,000		47,644	39,094		402,644	342,094	

(Rubber Manufacturers' Association figures raised to 100%)

* Revised.

Note: Complete figures for 1934 and 1935 were revised by the R.M.A. on May 1, 1936.

STOCKS IN GREAT BRITAIN

(No. of Tons in Wharves and Warehouses, not including Latex)

At end of	London 1934	London 1935	London 1936	Liverpool 1934	Liverpool 1935	Liverpool 1936
January	38,570	81,807	84,791	51,702	66,405	77,188
February	38,752	87,605	79,757	52,730	67,983	77,138
March	40,501	92,664	74,779	53,813	69,218	72,823
April	42,413	94,361	68,932	53,695	70,584	71,388
May	42,190	95,722	61,349	54,007	71,927	69,150
June	45,674	98,077	55,993	54,028	73,131	66,173
July	50,490	99,226	49,575	55,414	74,915	63,715
August	48,953	101,574	45,749	56,246	75,584	62,367
September	56,193	101,198	44,364	56,848	76,263	59,485
October	63,079	94,749	40,777	57,818	76,400	55,738
November	67,656	90,542		60,106	76,301	
December	72,285	86,551		62,505	77,589	

(Figures from the Rubber Trade Association of London)

STOCKS IN OTHER CENTRES

(Figures from Statistical Bulletin of the Int'l Rubber Regulation Committee)

At end of 1935	Penang and Singapore [1]	Malaya [2]	Ceylon [2]	Holland	Para and Manaos
December	28,304	33,899*	4,794	1,553	4,683
At end of 1936					
January	31,195	35,231*	4,504*	1,568	4,496
February	38,421	34,109	4,475	1,532	6,199
March	29,322	31,723	3,866	1,547	4,864
April	32,200	34,090	3,123	1,497	4,873
May	26,687	33,179	3,379*	1,360	4,522
June	28,260	34,166	3,057	1,070	4,502
July	29,443	34,395	3,610	1,026	4,696
August	28,289	34,849	3,961	979	1,742*
September	26,936	33,351	3,930	....	1,817

[1] Dealers' and Port Stocks. [2] Inside Regulated Areas. [3] Dealers' Stocks Only.
* Revised.

RUBBER STOCKS AFLOAT

End of: 1935	Afloat for United States	Afloat for Europe	All Other * Afloat	Total * Afloat
October	49,913	29,000	20,087	99,000
November	46,588	26,250	16,162	89,000
December	39,094	25,200	18,706	83,000
End of: 1936:				
January	43,870	20,160	19,970	84,000
February	46,532	18,690	19,778	85,000
March	58,935	16,820	14,245	90,000
April	47,678	17,025	18,297	83,000
May	48,860	18,670	21,470	89,000
June	47,228	20,200	22,572	90,000
July	60,343	20,300	25,357	106,000
August	63,597	19,800	15,603	99,000
September	62,240	18,000	15,760	96,000
October	67,825	18,500	17,675	104,000

* *Total Afloat* is an arbitrary estimate based on 1½ months' shipments as adopted by the Department of Commerce. *All Other Afloat* is determined by subtracting the amount of stocks in transit to the United States and Europe from the estimated total.
P—Preliminary estimate.

TOTAL WORLD STOCKS

(Figures from the Survey of Current Business)

At end of	1931	1932	1933	1934	1935	1936
January	510,296	638,416	634,797	661,948	698,153	600,479*
February	516,123	626,819	626,227	663,308	686,195	599,355*
March	532,080	629,894	638,428	666,382	678,809	574,594*
April	531,832	630,803	629,159	658,796	677,006	558,583
May	528,855	627,474	626,537	689,239	677,569	532,411
June	533,021	595,712	613,055	672,804	671,525	511,931*
July	548,794	589,037	618,258	676,200	679,061	510,872*
August	555,931	597,274	617,449	674,702	680,644	492,439*
September	561,838	599,986	623,683	694,361	661,509	485,500
October	588,873	609,368	636,597	680,616	655,000	
November	605,684	614,342	642,968	684,408	623,300	
December	628,826	629,898	654,890	705,975	611,987*	
Monthly Average.	553,513	615,752	630,171	677,395	666,729*	

* Revised.

U. S. Tire and Tube Statistics[1]

(All Figures Represent Thousands)

AUTOMOBILE CASINGS

Figures for Recent Years

	1928	1929	1930	1931	1932	1933	1934	1935
Production	77,944	68,726	50,965	48,740	40,085	45,303	47,233	49,362
Shipments	74,296	69,395	53,638	50,061	40,251	44,094	46,597	50,183
Inventory [2]	13,624	11,838	9,003	7,775	7,644	8,888	9,455	8,196

Figures for Recent Months

	PRODUCTION 1934	PRODUCTION 1935	PRODUCTION 1936	SHIPMENTS 1934	SHIPMENTS 1935	SHIPMENTS 1936	INVENTORY 1934	INVENTORY 1935	INVENTORY 1936
Jan.	3,922	4,626	4,579	3,222	3,663	3,875	9,684	10,398	8,917
Feb.	4,335	4,383	3,577	3,285	3,287	3,211	10,725	11,530	9,263
Mar.	5,180	4,346	3,638	4,223	4,204	3,856	11,651	11,675	9,086
Apr.	4,470	4,512	4,854	4,438	5,144	4,903	11,981	11,003	9,033
May	4,456	4,175	4,971	5,332	4,067	5,832	11,127	11,131	8,175
June	4,342	3,910	5,610	5,228	4,262	5,792	10,219	10,755	7,831
July	3,353	3,532	5,465	4,157	5,447	5,744	9,437	8,850	7,746
Aug.	3,533	3,993	5,014	4,308	4,739	4,976	8,697	7,805	7,793
Sept.	2,936	3,787	4,981	3,183	3,303	3,836	8,419	8,288	9,005
Oct.	3,287	4,051		3,010	4,055		8,657	8,291	
Nov.	3,341	3,997		3,191	3,930		8,779	8,249	
Dec.	3,778	4,051		3,109	4,081		9,455	8,196	

AUTOMOBILE INNER TUBES

Figures for Recent Years

	1928	1929	1930	1931	1932	1933	1934	1935
Production	80,180	68,829	52,420	48,333	36,891	42,556	46,228	47,879
Shipments	77,127	70,592	54,938	50,021	37,911	41,391	45,046	48,067
Inventory [2]	16,117	12,807	9,999	7,922	6,749	7,815	9,180	8,231

Figures for Recent Months

	PRODUCTION 1934	PRODUCTION 1935	PRODUCTION 1936	SHIPMENTS 1934	SHIPMENTS 1935	SHIPMENTS 1936	INVENTORY 1934	INVENTORY 1935	INVENTORY 1936
Jan.	3,551	4,259	4,592	3,199	3,722	4,168	8,403	9,621	8,623
Feb.	4,078	4,171	3,556	3,323	3,362	3,446	9,167	10,466	8,699
Mar.	5,194	4,123	3,787	4,118	4,168	3,796	10,244	10,406	8,692
Apr.	4,735	4,259	4,824	4,342	4,453	4,746	10,585	10,170	8,788
May	4,359	3,892	4,819	4,902	3,451	4,919	10,043	10,615	8,719
June	4,097	3,480	5,035	5,309	4,024	5,504	8,795	10,050	8,105
July	3,531	3,251	5,177	4,323	5,269	5,758	8,053	8,005	7,725
Aug.	3,680	3,894	5,039	4,198	4,556	5,136	7,555	6,939	7,621
Sept.	3,110	4,125	5,161	3,024	3,426	4,231	7,639	7,565	8,627
Oct.	3,219	4,435		2,689	3,987		8,151	8,053	
Nov.	3,169	3,942		2,767	3,687		8,503	8,161	
Dec.	3,503	4,048		2,850	3,962		9,180	8,231	

(1) These figures have been adjusted to represent 100% of the industry based on reports received by the Rubber Manufacturers' Association which represent 80% for 1931-1932-1933; 97% for 1934-1935; 81% for 1936. All figures through September, 1936, were revised in December, 1936. Annual figures are more accurate.
(2) Held by manufacturers at end of period indicated.
(*) Revised.

Automobile Production

	United States Total	United States Passenger Cars	United States Trucks	Canada Total	Canada Passenger Cars	Canada Trucks	Grand Total
1928	4,357,384	3,826,613	530,771	242,382	196,737	45,645	4,599,944
1929	5,358,420	4,587,400	771,020	263,295	207,498	55,797	5,621,715
1930	3,355,986	2,814,452	540,534	154,192	125,442	28,750	3,510,178
1931	2,389,730	1,973,090	416,640	82,621	63,477	19,144	2,472,351
1932	1,370,678	1,135,493	235,187	60,816	50,718	10,098	1,431,494
1933*	1,920,057	1,573,512	346,545	65,924	53,855	12,069	1,992,124
1934*	2,753,111	2,177,919	575,192	116,852	92,647	24,205	2,869,963
1935	4,009,496	3,285,836	723,660	172,995	139,742	33,253	4,182,491
1935							
Oct.*	272,043	213,310	58,733	8,273	6,803	1,470	280,316
Nov.*	395,059	336,914	58,145	13,491	10,916	2,575	408,550
Dec.*	404,528	322,096	61,506	13,789	10,666	3,123	418,317
1936							
Jan.*	364,004	298,274	65,730	13,302	11,261	2,041	377,306
Feb.*	287,606	224,816	62,790	13,268	10,853	2,415	300,874
Mar.*	420,971	343,523	77,448	18,021	14,488	3,553	438,992
April	502,775	417,133	85,642	24,951	20,247	4,704	527,726
May	460,565	385,507	75,058	20,006	16,389	3,617	480,571
June*	452,955	375,894	77,061	16,400	13,126	3,274	469,355
July	440,999	372,402	68,597	10,475	8,192	2,283	451,474
August	271,291	209,754	61,537	4,660	3,051	1,609	275,951
Sept.	135,130	90,597	44,533	4,655	2,481	2,174	139,785
Oct.	224,628	190,688	33,940	5,361	4,592	769	229,989

* Revised.
Note: U. S. figures represent factory sales; Canadian figures represent production.

Exports of Crude Rubber from Principal Producing Countries

(Long Tons)

	BRITISH MALAYA [1]								DUTCH EAST INDIES [5]						
	Gross Exports	Imports	Gross Exports Minus Imports	Ceylon [2]	India & Burma [3]	Sarawak [4]	British North Borneo [5]	Siam [6]	Java & Madura	Sumatra E. Coast	Other D.E.I.	Indo-China [7]	Amazon Valley	All Other [8]	World Total [9]
1923	252,016	70,432	181,584	39,971	6,416	5,705	4,237	1,718	32,930	46,344	57,822	5,067	16,765	7,856	406,415
1924	259,706	108,524	151,182	39,997	7,697	6,699	4,621	2,962	42,446	54,497	80,347	6,688	23,165	9,065	429,366
1925	316,825	158,022	158,803	49,366	10,082	5,424	5,377	5,377	46,757	65,499	120,626	7,881	25,298	13,797	514,487
1926	391,328	151,243	240,085	58,962	9,874	9,155	6,079	4,027	52,186	71,413	121,231	8,203	24,298	16,017	621,530
1927	371,322	182,845	188,477	55,356	11,321	10,923	6,582	5,472	55,297	77,815	142,171	8,645	28,782	15,633	606,474
1928	409,430	149,787	259,643	57,267	10,790	10,087	6,698	4,813	58,848	82,511	121,770	9,548	21,129	10,690	633,794
1929	574,836	163,092	411,744	81,584	11,663	11,077	7,381	5,018	65,990	87,789	134,037	9,696	21,148	6,767	853,894
1930	547,043	133,876	413,167	76,970	10,782	10,309	6,781	4,251	69,755	79,396	115,254	7,665	14,260	5,651	814,241
1931	519,740	125,506	394,234	61,769	8,470	10,451	6,247	4,218	75,952	87,747	116,009	11,696	12,121	3,294	792,203
1932	478,252	92,539	385,713	48,973	3,888	6,960	4,664	3,451	61,312	79,837	85,871	13,883	6,450	1,816	702,818
1933	573,412	167,377	406,035	63,351	4,527	10,874	7,555	7,765	73,851	91,861	149,659	18,394	9,883	2,737	846,312
1934	677,361	211,803	465,558	79,746	10,492	17,233	11,103	17,545	87,400	112,058	175,470	20,170	8,903	2,985	1,008,663
1935	590,522	176,705	413,817	53,584	13,134	20,850	8,868	28,051	57,479	78,362	135,247	29,949	11,125	5,055	856,245
1934:															
Sept.	61,051	17,889	43,162	6,555	294	1,438	839	1,626	5,722	10,738	14,688	1,665	764	222	87,713
Oct.	47,045	10,226	36,819	6,544	413	1,412	1,196	1,328	5,970	6,643	5,556	1,413	840	401	68,535
Nov.	51,140	8,759	42,381	6,756	501	953	941	1,356	7,621	7,123	5,338	2,356	1,017	334	76,676
Dec.	59,575	15,375	44,200	8,481	990	1,237	680	2,043	10,865	12,953	12,354	2,956	1,035	239	98,033
1935															
Jan.	56,720	17,142	39,578	5,202	2,269	1,630	1,222	2,614	3,812	5,371	8,704	2,650	1,196	460	74,719
Feb.	50,593	17,676	32,917	5,556	731	1,887	760	2,288	4,395	7,663	15,194	2,076	636	254	74,154
Mar.	47,407	13,437	33,970	3,181	701	1,901	773	2,076	5,592	7,950	7,973	1,472	740	526	66,855
Apr.	53,360	16,029	37,331	2,976	370	1,895	846	1,661	5,574	6,873	12,683	2,827	963	185	74,957
May	51,353	23,720	27,633	4,223	674	2,323	848	2,752	6,217	7,931	21,058	2,138	832	315	76,920
June	49,751	18,637	31,114	3,525	1,077	2,031	603	2,869	5,698	8,258	14,168	2,021	659	393	72,416
July	48,975	11,257	37,718	4,106	580	1,870	1,164	1,939	5,899	5,664	8,373	2,015	427	407	70,162
Aug.	51,873	10,978	40,895	5,683	724	759	566	2,062	4,661	6,923	8,875	2,451	1,150	442	74,541
Sept.	51,247	10,418	40,829	3,970	681	1,797	421	2,278	4,089	5,862	9,422	2,248	1,017	493	73,107
Oct.	48,258	19,364	28,894	5,932	1,198	2,168	1,040	2,622	3,937	6,698	16,432	2,748	1,240	462	73,371
Nov.	43,147	10,518	32,629	4,288	1,806	1,356	455	2,155	3,724	3,963	8,511	2,392	936	587	62,802
Dec.	37,838	7,529	30,309	4,942	2,323	1,233	171	2,735	3,881	5,206	3,854	4,911	1,329	531	61,425
1936:															
Jan.	39,101	12,582	26,519	4,131	1,293	2,317	938	1,665	4,315	6,347	9,270	2,449	1,606	613	61,463
Feb.	38,436	18,857	19,579	3,664	1,382	2,111	529	3,663	4,789	6,643	15,479	2,892	1,201	832	62,764
Mar.	46,552	12,026	34,526	4,336	1,324	1,848	342	2,966	4,484	5,052	8,949	2,553	1,264	586	68,230
Apr.	35,999	14,698	21,301	3,172	1,255	2,053	869	1,596	4,895	6,446	12,612	2,417	1,056	693	58,365
May	46,568	12,527	34,041	2,560	1,115	2,354	517	2,293	4,258	6,015	10,743	2,340	956	594	67,786
June	40,049	15,026	25,023	3,780	1,253	1,386	461	3,737	4,577	6,519	14,370	2,733	943	584	65,366
July	53,114	19,038	34,076	3,496	1,379	1,399	1,035	3,734	6,133	8,578	17,653	2,737	973	640	81,833
Aug.	43,506	13,361	30,145	4,019	809	2,541	656	3,284	4,978	7,353	11,924	3,017	529	791	70,046
Sept.	44,110	10,039	34,071	5,390	685	1,139	537	3,259	4,531	6,241	9,981	3,503	1,030	720	71,087
Oct.	46,543	12,960	33,583	5,624	1,200	2,143	1,086	3,349	6,477	8,145	12,881	3,874	1,200	700*	80,262

(1) Malayan net exports cannot be taken as production, since imported rubber is largely wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 115 tons in 1923, 1,117 in 1924, 3,618 in 1925, 3,263 in 1926, 2,439 in 1927, 1,437 in 1928, 2,670 in 1929, and 1,274 in 1930. (2) Ceylon Chamber of Commerce statistics until 1926; rubber exported as latex is not included—such shipments were equivalent to 18 tons in 1923, 93 tons in 1924, 6 tons in 1925, 20 tons in 1926, about ½ ton in 1927, and 1 ton in 1928, and practically none in 1929, 1930 and 1931. (3) Official statistics. (4) Imports into Singapore and Penang. (5) Exports from "Other D.E.I." are chiefly wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 2,342 tons in 1923, 1,008 tons in 1924, 2,239 tons in 1925, 44 tons in 1926, 84 tons in 1927, 1,459 tons in 1928, 1,302 tons in 1929, and 2,656 tons in 1930. (6) Calculated from official import statistics of principal consuming countries, viz., United States, United Kingdom, France, Germany, Belgium and Netherlands, and includes guayule rubber. (7) This total includes the third column for British Malaya, "Gross Exports minus Imports," and all the figures shown for the other territories. * Figure is provisional: final figure will be shown when available.

NOTE: THE FIGURES FOR 1933 ARE REVISED AS OF JANUARY 25, 1935 AND REPRESENT FINAL FIGURES

Net Imports of Crude Rubber into Principal Manufacturing Countries

(*Long Tons*)

	United States [1]	United Kingdom	France (h)	Germany	Canada (ac)	Japan (da)	Italy	Russia (ce)	Australia (cd)	Belgium (d)	Netherlands	Scandinavia (abcdf)	Spain (g)	Czechoslovakia (abcd)	World Total
1919	238,407	42,671	17,685	5,584	6,395	9,753	9,894	75	1,002	3,995	2,771	3,149	2,418	9	343,808
1920	249,530	56,844	13,882	11,890	11,746	5,297	6,123	62	1,815	3,840	5,510	2,292	2,008	567	371,409
1921	179,736	42,087	15,135	21,920	8,124	21,713	3,906	165	1,014	1,705	1,022	1,279	2,245	569	300,620
1922	296,594	11,724	24,352	27,546	9,207	15,934	6,430	2,493	2,643	172	—3,807	1,778	589	567	396,222
1923	301,527	12,700	27,392	18,519	13,277	15,372	8,489	2,986	1,649	2,184	792	2,528	630	1,128	409,173
1924	319,103	—11,550	30,446	22,727	14,299	19,571	8,764	2,346	3,124	2,688	—807	3,178	944	1,370	416,203
1925	385,596	4,061	32,956	33,937	19,683	11,117	11,412	7,088	4,757	2,930	875	3,149	1,155	1,558	520,274
1926	399,981	84,865	34,240	22,775	20,229	18,125	9,809	6,529	9,021	2,498	2,670	4,046	1,299	1,870	617,957
1927	403,472	60,249	34,271	38,892	26,405	20,521	11,381	12,018	9,490	6,482	636	4,224	2,055	2,672	632,768
1928	407,572	4,846	36,498	37,855	30,447	25,621	12,433	15,134	8,430	7,958	2,243	4,418	3,178	3,138	599,771
1929	528,608	122,675	55,093	49,275	35,453	34,284	17,169	11,774	15,886	9,445	3,022	6,440	864	4,650	894,638
1930	458,036	120,069	68,503	45,488	28,793	33,039	18,639	16,387	5,354	10,635	2,924	7,710	2,400	4,468	822,445
1931	475,993	86,170	46,466	39,688	25,261	43,483	10,149	30,671	7,649	11,009	2,220	6,360	2,605	7,717	794,641
1932	393,844	44,086	42,506	45,121	20,917	56,027	14,469	30,637	12,576	9,519	2,851	7,262	4,359	9,444	693,618
1933	398,365	73,335	61,953	54,120	19,332	66,831	19,341	29,830	13,534	11,166	1,243	7,831	5,520	10,402	772,803
1934	439,172	158,482	49,560	59,330	28,439	69,905	21,398	47,271	9,642	9,115	3,758	12,418	6,900	10,999	926,389
1935	455,758	128,829	51,450	62,899	26,870	57,567	21,880		9,978	7,593	4,068	11,878	8,140	11,245	
1935															
Apr.	40,061	11,574	3,306	5,820	1,063	6,635	1,653	3,387	1,150	520	329	1,049	432	789	78,115
May	29,962	12,498	3,828	6,049	3,929	5,429	935	1,937	671	982	272	853	815	774	68,934
June	31,410	10,253	3,210	4,551	1,435	3,373	1,831	3,087	496	1,065	446	780	745	604	66,286
July	47,694	9,454	3,247	4,929	1,319	4,484	1,298	1,823	520	572	157	800	548	185	77,030
Aug.	41,057	14,120	4,508	4,790	2,814	4,453	916	1,227	655	528	413	820	752	673	77,726
Sept.	35,256	11,223	3,740	5,453	1,604	3,590	1,696	1,593	449	806	282	1,030	793	914	68,429
Oct.	35,770	3,184	5,175	6,074	812	4,727	2,500*	4,876	829	539	671	1,000	597	742	67,496
Nov.	25,756	2,942	4,731	6,258	4,389	4,361	2,000*	4,858	783	449	245	1,206	1,044	1,276	60,298
Dec.	38,072	4,779	5,522	4,823	2,567	6,112	2,500*		1,019	1,074	287	1,359	750	1,466	
1936:															
Jan.	33,260	4,573	6,755	5,545	1,759	4,355	1,500*	467	1,260	760	369	736	664	767	62,770
Feb.	33,789	1,271	6,264	5,257	1,900	2,786	1,000*	94	735	799	106	497	1,312	344	56,154
Mar.	33,743	—1,227	4,333	4,569	1,811	5,170	1,000*	4,376	819	1,033	339	754	1,113	410	58,243
April	44,948	2,097	4,250	5,497	1,079	4,929	1,500*	3,251	919	1,097	238	848	679	603	71,935
May	35,549	302	4,335	4,639	2,221	5,531	1,000*	4,220	1,034	698	103	657	500*	667	61,456
June	35,901	—1,493	4,846	5,698	2,042	4,567	1,500*	2,427	1,635	579	—27	650	500*	323	59,148
July	38,556	—766	4,621	6,837	2,274	5,126	2,000*	1,733	1,363	713	183	1,094	500*	495	64,729
Aug.	41,094	—1,581	4,513	6,556	3,781	4,305	1,500*	3,128	807	789	42	1,145	500*	989	67,440
Sept.	49,483	—12	4,393	6,006	2,393	5,195	1,500*	2,922	2,297	514	471	1,090	300*	624	77,176
Oct.	40,301	—87		7,232		6,600	1,500*		1,092	817	343		200*	1,026	

a—Including gutta percha. b—Including balata. c—Re-exports not deducted in monthly statistics. d—Including some scrap and reclaimed rubber. e—Official statistics of rubber imports by Soviet Russia. f—Including Norway, Sweden, Denmark and Finland. g—United Kingdom and French exports to Spain except in years prior to 1925. h—French imports have been reduced 12 per cent in order to eliminate imports of gutta percha and to reduce to basis of net weight. [1] United States imports of guayule are included in this compilation. * Figure is provisional; final figure will be shown immediately it becomes available.

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